



UNIVERSITY  
of VIRGINIA

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of LEADERSHIP *and* PUBLIC POLICY

## **Increase the Number of Qualified Special Education Teachers in Public Schools in California**



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Prepared for Council for Exceptional Children

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## **DISCLAIMER**

“The author conducted this study as part of the program of professional education at the Frank Batten School of Leadership and Public Policy, University of Virginia. This paper is submitted in partial fulfillment of the course requirements for the Master of Public Policy degree. The judgments and conclusions are solely those of the author, and are not necessarily endorsed by the Batten School, by the University of Virginia, or by any other entity.”

Longfei Xu

## **ACRONYMS AND ABBREVIATIONS**

AACTE—American Association of Colleges for Teacher

APLF—Assumption Program of Loans for Education

BEST—Beginning Educator Support and Testing

BTSA—Beginning Teacher Support and Assessment

CalSTRS—California State Teachers' Retirement System

CCTC—State of California Commission on Teacher Credentialing

CEC—Council for Exceptional Children

CSBA—California School Boards Association

GTF—Governor's Teaching Programs

LPFCH—Lucile Packard Foundation for Children's Health

MSEPD—Masters in Special Education Program Guide

NCEE—National Center for Education Evaluation and Regional Assistance, Institute of Education Sciences

SFTR—San Francisco Teacher Residency

SFUSD—San Francisco Unified School District

UESF—United Educators of San Francisco

USF—University of San Francisco

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## EXECUTIVE SUMMARY

In California, there is a rapid increase in the number of underprepared special education teachers in the classrooms. From 2010 to 2016, the number of underprepared special education teachers nearly doubled. Some people insist that the entry of underprepared special education teachers in classrooms could help deal with the shortage of special education teachers. This effect might be positive in the short term. However, in the long term, underprepared special education teachers are likely to negatively affect the development and well-being of children with disabilities, and result in a higher teacher attrition rate in special education.

Council for Exceptional Children (CEC) is a national organization, aiming at helping children with disabilities succeed by preparing special education teachers, giving the government suggestions and advocating practical programs and policies.

In this report, by referring to past strategies, I propose three alternatives for CEC in order to increase the number of qualified special education teachers in California. Here are the alternatives:

- (1) Continue a loan forgiveness program only in special education;
- (2) Recruit retired special education teachers and give them access to high-quality statewide induction programs;
- (3) Establish a new teacher residency program in special education.

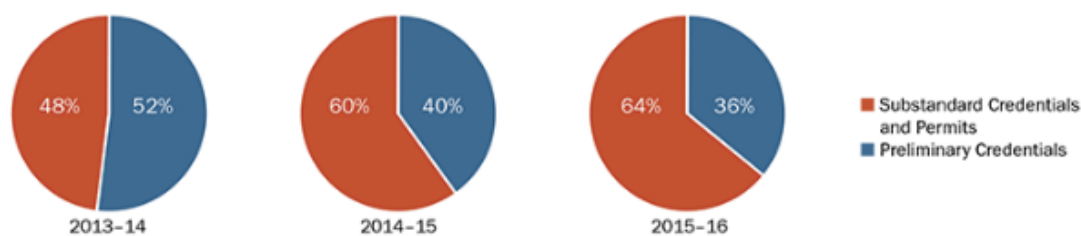
I evaluate these three alternatives through five criteria: (1) effectiveness: the number of additional qualified special education teachers in each alternative; (2) cost; (3) the cost-effectiveness: the average cost per additional qualified special education teacher in each alternative; (4) long-term teacher retention rate: the teacher retention rate among additional qualified special education teachers over five years; and (5) administrative feasibility. Based on analysis, I recommend to establish a new teacher residency program in special education (alternative 3).

## PROBLEM STATEMENT

**In California, a large number of underprepared special education teachers are entering public school classrooms.** Between 2011 and 2016, the number of new special education teachers with substandard credentials and permits nearly doubled (from 2,111 to 4,004) (see Figure 2). During the same time period, there was a 30% decrease (from 3,162 to 2,259) in the number of fully certified new special education teachers (Carver Thomas & Darling-Hammond, 2017). In 2016 alone, approximately 64%, or 4,000, new special education teachers were hired with substandard credentials or short-term permits (see Figure 1). However, in the same year, only 2,259 new special education teachers, accounting for 36% of the total population of new teachers, held credentials as fully prepared special educators (Carver-Thomas & Darling-Hammond, 2017) (see Figure 1).

**Figure 1: New, Underprepared Special Education Teachers Outnumber Those Who Are Fully Prepared 2:1**

*Proportion of preliminary and substandard special education authorizations issued, 2013–14 to 2015–16*

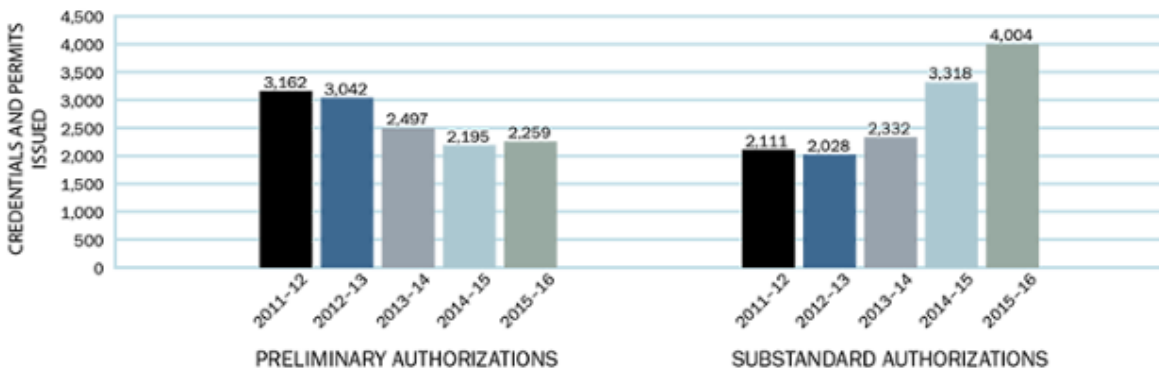


Source: California Commission on Teacher Credentialing.

Source: Learning Policy Institute, 2017.

**Figure 2: Trends in Special Education Teacher Supply**

*Preliminary and substandard authorizations issued, 2011–12 to 2015–16*



Source: California Commission on Teacher Credentialing.

Source: Learning Policy Institute, 2017.

## CONTEXT OF THE PROBLEM

In order to put forward effective policy recommendations to increase the number of qualified special education teachers in California, understanding the context of special education in California and across the United States is the first step. Therefore, the following section will discuss three things: (1) the standards for special education teacher preparation in California, (2) background on students with disabilities and special education teachers in California, and (3) the impacts of special education teachers on students with disabilities.

### The standards for special education teacher preparation in California

Since the requirements for special education teachers vary from states to states, I will only focus on the requirements in California here. The qualified special education teachers, also called fully-prepared special education teachers, mean the teachers with full credentials approved by the state; the underprepared special education teachers means the teachers with substandard credentials and permits. The following section will discuss the difference between full credentials and substandard credentials in California.

#### *Full credentials*

For each fully-prepared special educator in California, he or she must obtain the “Education Specialist Instruction Credential” through a two-level process—starting with a “preliminary credential” and end up with a “clear credential” (CCTC, 2018; TEACH California, 2019). At the first level of obtaining preliminary credentials (valid for five years), holding a bachelor’s degree are a prerequisite for all special education teacher candidates; after graduating from a CCTC-approved teacher preparation program, these candidates must pass the state assessments to demonstrate basic teaching skills (especially in reading instruction competency) and competence in the subjects they want to teach. The preliminary credential is designed to guarantee the competency of new special education teachers. Before preliminary credentials are expired, candidates need to either complete a CCTC-approved teacher induction program or earn a national teaching certification in special education, in order to obtain clear credentials (Carver-Thomas & Darling-Hammond, 2017; TEACH California, 2019). The clear credential is designed to help new special education teachers become experienced and effective in the classroom teaching toward students with disabilities.

#### *Substandard credentials*

In order to address the shortage of teachers both in general education and special education, California has reduced the requirements for all teachers since 2005 (Carver-Thomas & Darling-Hammond, 2017). As a result, individuals without full credentials are able to teach students with disabilities, as long as they meet the substandard credentials authorized by the state, which include three categories: intern credentials, permits/waivers, and emergency credentials (Carver-Thomas & Darling-Hammond, 2017). These three kinds of substandard credentials result in a large number of underprepared teachers in special education. In terms of intern credentials, although individuals still need to pass the state assessments, they could teach even though they are taking related courses (CCTC, n.d.). For permits or waivers, individuals are allowed to teach the subjects in a teaching position that is badly in need of a teacher to fill, even outside of their own expertise (CCTC, 2005). In addition, if individuals could obtain Emergency credentials,

they would be allowed to teach for one year, but not need to complete teacher preparation programs or pass the state assessments (CCTC, 2014).

### Background on students with disabilities and special education teachers in California

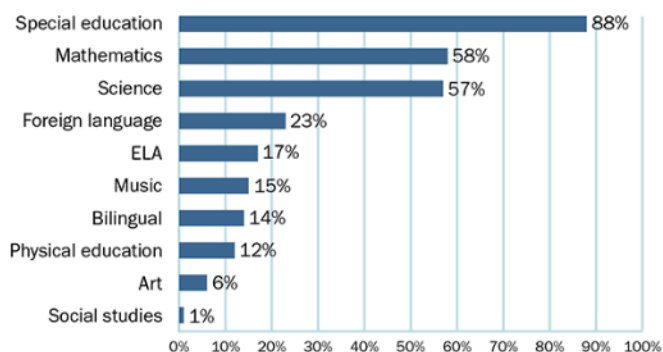
In California, more and more students with disabilities are entering public school classrooms (LPFCH, 2019). Between 2011 and 2016, the number of students with disabilities in public school classrooms in California increased by 22.4%, from 599,770 to 734,422 (LPFCH, 2019). Therefore, school districts are likely to hire more special education teachers in classrooms.

Although the number of students with disabilities only accounts for a small part (approximately 10%) among all students in public schools in California, the shortage of teachers in special education is the most serious among all subject areas (LPFCH, 2019; Podolsky & Sutchter, 2016). Among 211 school districts in the sample data, 88% of them reported the shortage of special education teachers (Podolsky & Sutchter, 2016) (see Figure 3). Podolsky and Sutchter (2016) point out that although this study did not cover all school district (roughly 1,025 in total) in California, the 211 school districts in the sample data could generally reflect the demographic characteristics of all school districts. Therefore, we can estimate that over 80% of all school districts are experiencing the shortage of special education teachers.

**Figure 3**

#### Teacher Shortages by Subject Area

*Percent of districts with shortages reporting the subject area(s) with shortages*



Source: Learning Policy Institute, 2016.

Therefore, with the growing number of students with disabilities and the lack of special education teachers in California, public schools have to recruit a large number of underprepared special education teachers to satisfy the demand in the short term.

### The impacts of special education teachers

Some researchers advocate that qualified teachers are prerequisite for special education, but a few studies show that the influx of underprepared special education teachers might generate positive effects. In this section, I will discuss the impacts of both underprepared and qualified teachers in special education. These effects are not only in California, but also in the Wole America.



### *The impacts of underprepared special education teachers*

One benefit of the entry of underprepared special education teachers is likely to increase the total number of special education teachers in the short term. Compared to general education, the teacher attrition rate in special education is always approximately doubled (McLeskey et al., 2004). It is also estimated that over one fourth of special education teachers in California in 2014 will retire in 10 years, even in some counties, the retirement rates are likely to be 86.5% (Carver-Thomas & Darling-Hammond, 2007). Although the average retirement rate in special education will be highest among all subject areas, the annual pool of them increased nearly 30% (from 13,793 to 10,355) with a large number of substandard credentials issued toward new special education teachers (Carver-Thomas & Darling-Hammond, 2017). Therefore, the influx of underprepared special education teachers might contribute to offsetting high teacher attrition and retirement rate in special education in a short run.

However, a number of studies point out that underprepared special education teachers could not only affect the effectiveness of classroom teaching for students with disabilities, but also result in a higher teacher turn-over in the future (Billingsley et al., 2009; Carver-Thomas & Darling-Hammond, 2017; Mohr & Anderson, 2001). For example, Billingsley et al. (2009) adopts a qualitative study and points out that it is more likely for new special education teachers who did not complete their preparation programs to leave the teaching positions.

### *The impacts of qualified special education teachers*

Research suggests that qualified special education teachers could advance the learning and well-being of children with disabilities (Boe et al., 2007; Brownell et al., 2010; Feng & Sass, 2010; Nougaret et al., 2005; Sindelar et al., 2004). Feng and Sass (2010) conducted a longitudinal study to estimate the effect of special education teacher quality on student academic performance. They find that special education teachers with higher educational degrees could do better in improving student mathematic performance, compared to those teachers only holding a baccalaureate degree (Feng & Sass, 2010). The effect of pre-service special education teacher preparation on the academic performance of students with disabilities (especially in reading courses) is statistically significant and substantially positive (Feng & Sass, 2010). This study provides quantitative evidence to estimate the relationship between special education teacher preparation and the academic achievement of students with disabilities, but it does not include all students with disabilities, such as those students with intellectual disabilities, due to the restriction of the sample data.

However, there is inconsistency regarding the effect of special education services on students with disabilities. Morgan et al. (2008) analyzed the data from the “Early Childhood Longitudinal Study” through a quasi-experimental study suggesting that special education services may effect children’s learning in mathematics/reading and their behaviors either negatively or non-significantly. However, this study only focused on the effect of special education services on prekindergarten children. Therefore, it is unclear regarding the effect of special education on other students with disabilities at other grade levels.

## LITERATURE REVIEW

In California, the number of under-prepared special education teachers nearly doubled (from 2,111 to 4,004) between 2011 and 2016, but there are only 10% of public school students in special education programs (approximately 734,442) in 2016 (Carver-Thomas & Darling-Hammond, 2017; LPFCH, 2019). Although the number of under-prepared special education teachers is increasing, the studies focusing on past strategies and policy recommendations in special education are limited, partially because special education only accounts for a small part of the whole education (Anderson et al., 2018).

However, there is still much to be learned from strategies for boosting the number of qualified teachers in general education, especially in shortage-field subjects (e.g. math, science and bilingual learning). In this section, the author will analyze three strategies (especially in California) —financial incentives, high-quality induction programs and teacher residency models — contributing to solving the problem of qualified teacher shortage in both general and special education by funding, recruiting and innovating.

### Financial incentives

Financial initiatives are becoming strategies for a large number of states and school districts in America to attract and keep qualified new teachers. Over 30 states are adopting financial initiatives, including improving teacher salaries and offering other compensations (e.g. signing bonus, housing assistance and scholarships) to the hard-to-staff area (Hirsch et al., 2001).

Researchers find that financial incentives can be effective depending on the characteristics and the implementations of these programs (Clotfelter, et al., 2008; Darling-Hammond, et al, 2017; Rosen, 2011; Steele, et al., 2010). Although there are various categories of financial incentives (i.e. scholarship, loan forgiveness, retention bonus and housing assignment), I will mainly discuss the categories successfully attracting qualified teachers in California, which could also provide more convincing models for California's special education. Here are two successful programs: (1) Assumption Program of Loans for Education (APLF) (a loan forgiveness program) and (2) Governor's Teaching Fellowship (GTF) (a fellowship program).

#### *Assumption Program of Loans for Education (APLF)*

The APLF aims at attracting excellent students to become qualified teachers and teach in shortage-area subjects, especially in mathematics, science and special education, by offering loan forgiveness (\$11,000-\$19,000) (Darling-Hammond et al., 2017; Steele et al., 2010). All APLF recipients must commit to teach in hard-to-staff subjects and/or schools for four years (Steel et al., 2010).

The APLF program successfully recruits more quality teachers. Between 1999 to 2007, the number of new quality teacher from the APLF program increased by 36.4%, from 5,500 to 7,500 (California Student Aid Commission, 2007). However, the political possibility is also relatively low for this program. In 2011, due to the budget restraints in education, the California's government stopped providing funds for new APLF recipients (Daling-Hammond et al., 2017).

### *The Governor's Teaching Fellowship (GTF)*

The GTF, established in 2000, serves to attract more high-quality teachers to work in low-performing schools through a fellowship. Specifically, it provides \$20,000 in total for each new teacher who was pursuing a teaching credential approved by the state and committed to teach for four years in a low-performing school; in other words, these teachers will receive \$5,000 per year of the four years in the commitment, but if they want to leave the school during the four years, they have to repay \$5,000 per year of the rest years that are not completed in the commitment (Darling-Hammond et al., 2017; Steele et al., 2010).

A number of studies show that this program contributes to attracting more quality teachers (Darling-Hammond et al., 2017; Steele et al., 2010). Between 2000 and 2002, this program successfully attracted 12,000 academically talented individuals to enter classroom in low-performing schools (Darling-Hammond et al., 2017). Based on a quasi-experimental study, Steele, et al. (2010) also find that new quality teachers will be 28 percentage points more likely to work in a low-performing school if they received the GTF. Since there is no data directly tracking GTF in California, the researchers draws on the records in the APLF program. Although the effect of GTF is statistically significant and positive in this study, it is likely to be limited to the GTF recipients who have received APLF.

However, the political feasibility of the GTF is likely to be low because of its high overhead cost. In 2000 to 2001, the California's government spent \$21 millions in this program; but only \$5 millions of the spending was awarded to the GTF recipients, since the applications were limited in the first year (Steele et al., 2010; Hill, 2002). In 2002 to 2003, due to a statewide budget constraint, the California's government decided to cease this program since 2003 (Hill, 2002).

In addition, for teacher retention, the effectiveness of financial incentives also varies in the magnitude of them in different states. In North Carolina, teachers with credentials could receive \$1,800 retention bonus per year if they are willing to teach in shortage-field subjects; after the implementation of this retention bonus, teacher turnover rate decreased by 17% (Cloefelter et al., 2018). This result suggests that modest financial incentives be likely to affect teacher retention, even in hard-to-staff schools. However, Steele et al. (2010) estimate that the effect of GTF on teacher retention in low-performing schools in California is not statistically significant, even though GTF provides \$5,000 per year for each recipient in its four-year contract. This study focuses on the effect of the GTF in its four-year period, so it might be demanding to estimate the teacher retention under GTF beyond four years.

### **High-quality statewide induction programs**

A high-quality induction program aims at improving the quality of new teachers and retaining them in their teaching position by providing them with efficient collaboration (with trained mentors), comprehensive professional development, and enough financial support (Brownell et al., 2004). There are two successfully statewide induction programs: (1) *Beginning Educator Support and Testing* (BEST, in Connecticut), (2) *Beginning Teacher Support and Assessment* (BTSA in California); new teachers could receive comprehensive supports from both programs, and all of these teachers should pass a performance assessment (Brownell et al., 2004).

Research indicates that high-quality statewide induction programs contribute to reducing teacher attrition and improving teacher skills and competence in practice (Billingsley et al., 2009; Brownell et al., 2004; Darling-Hammond et al., 2016). In California, the teacher attrition rate among graduate from the BTSA program maintained at 9% within five years, compared to 37% for teachers who were not in this program; in Connecticut, the teacher attrition rate among all teachers in the induction program is lower, at approximately 3% per year (Brownell et al., 2004). These results come from the direct observation toward the number of teachers, rather than a quantitative test for the relationship between teacher attrition and the induction programs.

However, these high-quality statewide induction programs might not boost the supply of quality teachers, especially for qualified special education teachers. In California, only full-prepared new special education teachers, at least holding a preliminary credential, are eligible to participate in BTSA (CCTC, 2018). In 2016, the share of teachers with preliminary credentials in special education only accounts for 36%, compared to 64% of the share of underprepared teachers (Carver Thomas & Darling-Hammond, 2017). Therefore, BTSA will preclude more than two third special education teachers participating in it at the beginning.

In addition, the cost of the high-quality statewide program is too high. In 2005, the California's BTSA program costs the state more than \$87 millions (Lovo et al., 2006). Therefore, it is likely that school districts would have difficulty in implementing this program without enough funds from the California's government. In 2010, since the state government in California cut the budget in BTSA and provided school districts with more flexibility to use funds, nearly half of school districts supported to shift funds away from BTSA, while 6% of school districts reported to eliminate this program (Taylor, 2011).

### Teacher residency models

Compared to traditional teacher preparation programs at college, teacher residency models establish another pathway of teacher preparation through a partnership between school districts and universities (Guha & Kini, 2016). These models provide residents with a one-year “residency” at school to apprentice with an expert and master-level teacher in a high-need classroom; in the meantime, residents are required to take related courses in a partnering university (in these models) and obtain a state-approved teacher credential and a master degree at the end of this year (Guha et al., 2016). Residents in these models receive fiscal support, including tuition and living stipends; in return, residents must commit to teach in a hard-to-staff teaching position in their living school districts for three or four years after the residency (Guha & Kini, 2016; Guha et al., 2016). In other words, the graduates from teacher residency models will meet the state standards for quality teachers and utilize those credentials in a high need subject area or district.

Research indicates that teacher residency models may contribute to preparing teacher candidates by clinic practice, and recruiting and retaining quality teachers in the teaching positions, especially in hard-to-staff subjects and schools (Guha et al., 2016; Perlstein et al., 2014). Some studies show that teacher retention rate of graduates in teacher residency models remain high,

from 80% to 90% after three years and from 70% to 80% after five years (Guha et al., 2016; Papay et al., 2012; Perlstein et al., 2014)

Although these studies provide evidence related to the effect of teacher residency models on teacher retention from both descriptive and quantitative perspectives, all of them only focus on the effect of one specific teacher residency model in its school district. It is likely that the effect of teacher residency models might be affected by the characteristics of different school districts.

In California, there are already 10 teacher residency programs focusing on attracting and preparing teachers in shortage-field areas (Darling-Hammond et al., 2017). In order to explain the effectiveness of a teacher residency program, especially in California, I will discuss the most successful one—San Francisco Teacher Residency (SFTR)—among these existing 10 programs.

#### *San Francisco Teacher Residency (SFTR)*

The SFTR program, established in 2010, is designed to attract residents to become high-quality teachers in math and science in a hard-to-staff school in San Francisco by a partnership between districts and universities (i.e. SFUSD, USF, Stanford University, and UESF) (Darling-Hammond et al., 2017; Guha et al., 2016). After successfully completing one-year “residency” at school and taking related courses at USF/Stanford University at night, residents in this program must obtain a preliminary teacher credential and a master degree, and commit to teach in math/science for three years in the SFUSD (Guha et al., 2016). Besides enough financial support<sup>1</sup> in this program, residents will receive two-year induction, including mentoring and coaching from SFTR, after becoming teachers in the district (“Teacher Residencies”, 2016).

One benefit of the SFTR program is that teacher retention rate among graduates from SFTR maintains a high level (“Teacher Residencies”, 2016). During the five-year period from 2010, approximately 80% of new teachers from SFTR still stay in their teaching positions, compared to 53% of other new teachers in SFUSD (“Teacher Residencies”, 2016).

However, the effectiveness of the SFTR program might be limited. Based on a report from Learning Policy institute (2016), only 150 prepared teachers in SFUSD come from the SFTR program from 2010 to 2016. In other words, SFTR could prepare approximately 30 teachers at average (“Teacher Residencies”, 2016).

In addition, the cost of teacher residency models (including SFTR) is likely to be high, especially for those models in shortage-area subjects. In California, the state provided \$75 millions in total in teacher residency models from 2018 to 2019, with nearly \$50 millions of them allocated to preparing residents to become quality special education teachers (CCTC, 2018).

A few studies point out that teacher residency models might not influence teacher retention immediately in one or two years. A report from NCEE points out that the difference between teacher retention for teachers graduating from teacher residency models and those that are not is

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<sup>1</sup> The SFTR program will provide residents educational funds (i.e. tuition, loan forgiveness and scholarship), living stipends (\$17,000), housing grants (\$15,000) and free health care benefits (“Teaching Residencies”, 2016). In addition, the mentoring teachers in this program could also receive stipend (\$1,500) per year (“Teaching Residencies”, 2016).

not statistically significant at the end of first year of teaching (NCEE, 2015). This study analyzes the effect of teacher residency models among different school districts, which decrease the effect of the characteristics of school districts on teacher retention.

### Conclusion for all strategies

In conclusion, all these three strategies more or less contribute to boosting the pipeline of quality teachers both in general education and special education depending on the type of programs. However, there are still some problems and/or barriers for implementing and continuing these strategies effectively. For example, high cost is one popular barrier.

## EVALUATION CRITERIA

This section will discuss five evaluation criteria—effectiveness, cost, cost-effectiveness, long-term teacher retention rate and administrative feasibility—for evaluating the projected outcomes from each alternative.

### Effectiveness

The proposal aims to increase the number of qualified special education teachers in California's public schools. Qualified special education teachers means these teachers could obtain full credentials—preliminary credentials and clear credentials. This criterion will measure the number of additional qualified teachers in special education in public schools if implementing each alternative. The measure of effectiveness will be based on previous literatures and a number of estimations from other organizations in the field of special education.

### Cost

This criterion will project the total cost when implementing each alternative. The total cost will only focus on capital costs, which includes the projected costs of each alternative itself, potential advocacy costs, and the administrative costs to develop each alternative. All costs analysis will be in 2019 USD by using average CPI in 2019.

### Cost-effectiveness

This criterion will examine which alternative will generate the greatest results by using the smallest amount of materials. The measure of cost-effectiveness equals the total cost in each alternative divided by the projected increasing number of fully-prepared special education teachers in California's public schools. The smaller the result of calculation, the more cost-effective the alternative will be. Therefore, the smallest value means that the alternative will result in the greatest increase in the number of quality special educators through lowest costs.

### Long-term teacher retention rate

This criterion aims to estimate the average teacher retention rate among additional qualified special education teachers from each alternative over five years. The higher the teacher retention rate, the more positive effects on students with disabilities. In other words, the best alternative could lead to the highest teacher retention rate over five years. It is difficult to give a specific number for this criterion, so I try to use a range to estimate this criterion by referring to previous studies.

### Administrative feasibility

This criterion will estimate whether or not CEC could implement the alternative. It is possible that the alternative is relatively effective but not feasible for the client due to a number of potential barriers. Three factors will be considered: (1) whether CEC could provide sufficient funding to the alternative; (2) whether CEC could provide effective supervisors and staff to develop the alternative; (3) whether people in CEC could support the alternative; and (4) whether CEC has jurisdiction to implement the alternative.

## ALTERNATIVES

This section will describe three possible alternatives. All of them aim at boosting the pipeline of quality special education teachers through attracting and retaining more quality teachers in special education.

### Alternative 1: continue a loan forgiveness program only in special education

This alternative is modeled from the APLF program in California. As is shown in the literature review, there are other types of successful financial incentives in California and other states, such as scholarship (i.e. GTF ) and retention bonus. However, I do not find evidence to prove that they could generate similar and positive effects in special education in California. Specifically, the GTF program focuses on qualified teachers in low-performing schools in California, while the retention bonus could generate positive effects in North Caronia (Cloefelter et al., 2008; Steele et al., 2010). Compared with that, the APLF program contributes to attracting more quality teachers to teach in shortage-area subjects, especially in mathematics, science and special education, by providing loan forgiveness (\$11,000-19,000) (Steele et al., 2010). Unfortunately, due to budget restriction, the state stopped providing funds for new entrants in the APLF program (Carver Thomas & Darling-Hammond, 2017).

Considering the positive effect of the APLF program, I propose to continue this program in special education in California. Based on the APLF program, this alternative will provide all participants who become qualified special education teachers \$15,000 in total; in return, participants must commit to teach in special education in four years (Fuentes-Michel, 2007). Specifically, participants will receive \$3,000 in the first year in the commitment and \$4,000 per year in the last three years (see table 1). However, if participants want to violate their commitments, they have to repay all financial support they have received from this alternative.

Table 1 the structure of loan forgiveness in alternative 1

After completion of:	The amount of loan forgiveness
First year	\$3,000
Second year	\$4,000
Third year	\$4,000
Fourth year	\$4,000
<b>Total</b>	<b>\$15,000</b>

Source: California Student Aid Commission, 2017

### Analysis

Summary of Alternative 1				
Effectiveness (the number of additional qualified special education teachers per year)	Cost	Cost-effectiveness (\$/additional qualified special education teachers)	Long-term teacher retention rate (over five years)	Administrative feasibility
Up to 687	\$25,218,452.38	No less than \$36,681.39	71%	Moderate



### *Effectiveness*

The criterion is based on the APLE program in California. From 1999 to 2006, the APLE, providing a loan forgiveness of \$11,000 to \$19,000, attracted 5,500 to 7,500 outstanding students to teach in teacher shortage areas, including math, science and special education (Darling-Hammond et al., 2016). On average, the APLE could increase the number of new qualified teachers from 687 to 937 per year (See Appendix A). Since the APLE program focuses on three subjects (i.e. math, science and special education), qualified teachers from this programs will teach not only in special education (but include special education). Therefore, I estimate that this alternative, modeled from APLE, will generate approximately 687 qualified special education teachers at most.

### *Cost*

Based on a report from California Student Aid Commission (Fuentes-Michel, 2007), the total costs for APLF was approximately \$20 millions, including the total amount of loan forgiveness and implementing and administrative fees. If we continue the APLF program in special education in this alternative, we can estimate that the total cost could be nearly \$20 millions in 2006 dollars. With the CPI Inflation calculator, the total cost in 2019 dollars could obtain approximately \$25,218,452.38 dollars (see Appendix A).

### *Cost-effectiveness*

Since the number of additional qualified special education teachers from this alternative is estimated to be no more than 687 and the cost is estimated to be \$25,218,452.38, the smallest cost-effectiveness is approximately to be \$36,681.39 per additional qualified special education teacher from this alternative (in 2019 dollars) (see Appendix A).

### *Long-term teacher retention rate*

The average retention rate of qualified teachers receiving APLF could obtain 71% from 1999 to 2003 (Steele et al., 2010). Since the APLF program includes teachers in special education, we could estimate that the retention rate of additional qualified special education teachers supported by the loan forgiveness in this alternative is likely to be approximately 71% over five years.

### *Administrative feasibility*

The administrative feasibility of this alternative is relatively moderate. First of all, it is not necessary for CEC to provide additional materials to prepare individuals who want to become special education teachers. What CEC needs to do is to provide funds and staff to track participants in their commitments. Second, the APLE program could lead CEC to implement a loan-forgiveness program. In addition, CEC could not only provide financial support for loan forgiveness, but also suggest the state government implement a policy. However, according to Steele et al. (2010), the overhead cost for a loan-forgiveness program is much higher than the cost for providing loan forgiveness. Therefore, it is hard for this alternative to receive support for most people in CEC.

## Alternative 2: recruit retired special education teachers and give them access to high-quality statewide induction programs

This alternative comes from the effects of high-quality statewide induction programs in California. Based on the literature review, the benefit of the BTSA program in California is to guarantee the average teacher retention rate among graduates from it at a high level, approximately 91%, over five years (Brownell et al., 2004). Although new special education teachers could participate in BTSA, only prepared teachers with preliminary credentials are eligible (Brownell et al., 2004). This condition has refused a large number of special education teachers to participate in BTSA at the beginning, since new special education teachers with preliminary credentials in California only account for 36% in 2016 (Carver-Thomas & Darling-Hammond, 2017).

In order to expend the positive effects of the BTSA program, I propose to adjust the original BTSA program by recruiting retired special education teachers, whether or not receiving preliminary credentials, to participate in it. This alternative has three advantages. First of all, retired special education teachers have built up clinical teaching experiences, which could offset a preliminary credential and save considerable costs of pre-service teacher preparation. Secondly, the participant of retired special education teachers could contribute to the pipeline of qualified special education teachers, making up the weakness of the original BTSA program. In addition, there is a privileged policy for re-entry special education teachers in California. Since 2009, retired special education teachers can apply for re-entering the working force as teachers or mentors in 180 days after their retirement; these teachers can also exempt the limitation of an earnings cap for retired teachers (CalSTRS, 2011). In other words, the salary of retired special education teachers cannot be affected, if they re-enter the work force in special education. Therefore, it might not be necessary to worry about the salary limitation for re-entry special education teachers.

## Analysis

Summary of Alternative 2				
<b>Effectiveness</b> (the number of additional qualified special education teachers per year)	<b>Cost</b>	<b>Cost-effectiveness</b> (\$/additional qualified special education teachers)	<b>Long-term teacher retention rate</b> (over five years)	<b>Administrative feasibility</b>
Up to 468	\$113,238,986.18	No less than \$241,911.96	91%	Low

### *Effectiveness*

By 2024, it is estimated that 4,681 special education teachers teaching in 2014 will retire (Darling-Hammond et al., 2016). On average, we could estimate that there are nearly 468 retired special education teachers per year (from 2014 to 2024). If we could successfully recruit these teachers and give them access to high-quality statewide induction programs, the maximum number of additional quality special education teachers is approximately to be 468.

### *Cost*

The main cost comes from implementing a high-quality induction program, such as BTSA. Since there is no any earnings cap for re-entry retired special education teachers in California, CEC needs to attract these retired teachers by advocating, rather than pay them more. In contrast, the total cost for the BTSA program is too high, over \$87 millions in 2005 (in 2015 dollars) (Lovo et al., 2006). With the CPI Inflation calculator, we could estimate that the total costs from this alternative might surpass \$113,238,986.18 in 2019 dollars if maintaining a high-quality state-wide program (see Appendix A).

### *Cost-effectiveness*

Since the increase number of qualified special education teachers is estimated to be no more than 468 and the cost is estimated to be \$113,238,986.18, the smallest cost-effectiveness is approximately to be \$241,911.96 per additional qualified special education teacher from this alternative (in 2019 dollars) (see Appendix A).

### *Long-term teacher retention rate*

Based on literature review, the average teacher retention rate over five years from the BTSA program is at approximately 91% (Brownell et al., 2004). Since new special education teachers could participate this program, the average teacher retention rate for special education teachers is also 91%. Therefore, if continuing this program in this alternative, we could estimate that the average teacher retention rate among additional qualified special education teachers could also obtain approximately 90% over five years.

### *Administrative feasibility*

The administrative feasibility is low. First of all, although the teacher retention rate in this alternative is high, the costs might be also high for CEC. Therefore, it is hard for most people, especially decision-makers, in CEC to support this alternative. Secondly, the main part of a high-quality statewide induction program is to provide mentoring and coaching for new teachers. However, CEC focuses on prepare special education teachers, rather than mentors. It means that CEC needs more other supervisors and staff to support this alternative. Therefore, the administrative feasibility is low.

### Alternative 3: establish a new teacher residency program in special education

This alternative is modeled from the effects of teacher residency models in the literature review. As is shown in the literature review, 150 qualified teachers in math and science graduate from the SFTR program in California between 2010 and 2016; over five years, 80% of these teachers are still teaching in their positions (“Teacher Residencies”, 2016). However, I find that the SFTR program might not cultivate a large number of qualified special education in a short term. Based on the characteristics of the SFTR program and other teacher residency programs (see literature review), I deduce that the geographical restriction is the major obstacle to attract more residents in these programs. Specifically, residents have to participate the teacher residency program in their districts, go to the partnering university at night, and teach only in their districts after completing this program (Guha et al., 2016).

Given the effects of teacher residency programs on the number and teacher retention rate of qualified teachers in California, I propose to establish a new teacher residency program in special education by adjusting the traditional ones to minimize the geographical restriction. The adjustment shows in three aspects. First, the new teacher residency program opens toward all residents with bachelor’s degrees in California, not just in some certain districts. Second, residents could take online special education courses in a partnering university in this program. Third, residents could teach in any districts in California, so long as they teach in special education after completing this program.

Therefore, here is the full description of the new teacher residency program in special education in California. Residents with a bachelor’s degree in California could participate this program. In this program, residents need to apprentice with a special education teacher at school for one year and take online courses in a partnering university. At the end of this one-year “residency” at school, residents have to obtain a preliminary credential and a master degree in special education. In addition, this program will provide residents enough financial support, including tuition and living stipends, in this one-year “residency”. In return, residents must commit to teach in special education for three years.

### Analysis

Summary of Alternative 3				
<b>Effectiveness</b> (the number of additional qualified special education teachers per year)	<b>Cost</b>	<b>Cost-effectiveness</b> (\$/additional qualified special education teachers)	<b>Long-term</b> teacher retention rate (over five years)	<b>Administrative feasibility</b>
Up to 300	\$24,524,430	No less than \$81,748.10	70-80%	High

#### *Effectiveness*

This criterion is based on the results of previous teacher residency programs in California. Currently, there are 10 teacher residency programs operating in rural and urban communities in California; they all aim at increasing the number of qualified teachers in shortage-area subjects

and hard-to-staff schools (Guha et al., 2016). In other words, these existing teacher residency programs include qualified teachers in special education, but not focusing on special education. According to Guha et al. (2016), the average increasing number of qualified teachers in hard-to-staff positions is approximately 30 per year per program. These programs require residents to enter classroom at night and/or on weekend in a local university to obtain a master degree in special education. However, this alternative would replace classroom courses with online programs and expand this program to a statewide level, which could deal with the geographic restrictions in traditional teacher residency models. Therefore, we could estimate that the maximum number of additional qualified special education teachers from this new teacher residency program is likely to obtain the total increase number from those 10 traditional models, with approximately 300 (see Appendix A).

#### *Cost*

The cost analysis is based on the cost from the SFTR program and the tuition of online special education program in California. Therefore, the cost in this alternative is estimated to be approximately \$24,524,430 in 2019 dollars (see Appendix A).

#### *Cost-effectiveness*

Since the maximum number of additional qualified special education teachers in this alternative is estimated to be 300 and the total cost is estimated to be approximately \$24,524,430 in 2019 dollars, the cost-effectiveness is more than \$81,748.10.

#### *Long-term teacher retention rate*

Based on the literature review, a number of studies show that teacher retention rate of graduates in teacher residency models remains high, from 70% to 80% over five years (Papay et al., 2012; Sloan & Blazevski, 2015; Berry et al., 2018). Although these programs do not focus on special education, they involve the preparation of qualified teachers in special education. Therefore, We can estimate that the retention rate for qualified special education teachers from this new teacher residency model is likely to be 70% to 80%.

#### *Administrative feasibility*

The administrative feasibility is high for this alternative. First of all, the state government will provide funding to establish teacher residency programs in special education (CCTC, 2018), so it is not necessary for CEC to invest excessive capitals in this program. Second, the main task of CEC is to build up a partnership with universities with online special education programs and supervise this new program, rather than spend more resources in training candidates of qualified special education teachers. This alternative might not mess with the original special teacher preparation in CEC. Third, CEC could refer to other teacher residency programs in California, which could relieve the pressure of managing this alternative.

## OUTCOME MATRIX

Table 2 summary of the projected outcomes from each alternative

<b>Evaluation criteria</b>	<b>Alternative 1: Continue a loan forgiveness program only in special education</b>	<b>Alternative 2: Recruit retired special education teachers and give them access to high-quality statewide induction programs</b>	<b>Alternative 3: Establish a new teacher residency program in special education</b>
<b>Effectiveness</b> (the number of additional qualified special education teachers per year)	Up to 687	Up to 468	Up to 300
<b>Cost</b>	\$25,218,452.38	\$113,238,986.18	\$24,524,430.00
<b>Cost-effectiveness</b> (the number of additional qualified special education teachers per year)	No less than \$36,681.39	No less than \$241,911.96	No less than \$81,748.10
<b>Long-term teacher retention rate</b> (among additional qualified special education teachers in each alternative over five years)	71%	91%	70-80%
<b>Administrative feasibility</b>	Moderate	Low	High

## TRADEOFFS FROM EACH ALTERNATIVE

Each alternative need tradeoffs in some aspects, so I summarize general pros and cons from each alternative in this section (see table 3 below).

Table 3 pros and cons from each alternative

<b>Alternatives</b>	<b>Pros</b>	<b>Cons</b>
<b>Alternative 1: Continue a loan forgiveness program only in special education</b>	(+) High effectiveness;  (+) Low cost;  (+) The most cost-effective among three alternatives.	(-) The administrative feasibility is moderate;  (-) no funds from the state government.
<b>Alternative 2: Recruit retired special education teachers and give them access to high-quality statewide induction programs</b>	(+) The teacher retention rate over five years is the highest among three alternatives (approximately 91%).	(-) High cost;  (-) The lowest cost-effective among three alternatives;  (-) The administrative feasibility is low.
<b>Alternative 3: Establish a new teacher residency program in special education</b>	(+) The lowest cost among three alternatives;  (+) High cost-effectiveness;  (+) The teacher retention rate over five years is high;  (+) The administrative feasibility is high;  (+) Funds supported by the state government.	(-) The effectiveness is the lowest among three alternatives.

## RECOMMENDATION

### **Alternative 3: Establish a new teacher residency program in special education**

Based on the analysis, I would recommend alternative three to establish a new teacher residency program in special education. This alternative could successfully attract individuals to become qualified special education teachers in California and maintain these teachers in their teaching positions at a high level. It could also generate the lowest cost and the highest administrative feasibility among these three alternatives (see table 2 and table 3). In addition, this alternative could help teacher candidates in special education build up clinical teaching experiences. Although the cost-effectiveness of this alternative is not the best compared to alternative one, the state government and other organizations would provide funds in teacher residency programs in special education. It means that CEC could spend less costs to obtain a same result. For CEC itself, this could contribute to improving the cost-effectiveness.

The tradeoff in this alternative is its effectiveness. As is shown in table 2, the effectiveness of alternative three is the lowest among these three alternatives. However, in a long term, it is possible that the effectiveness of this alternative could surpass the other two alternatives. In terms of the first alternative, it is difficult to receive the support from the state government, since the state government has decided not to provide more funds in the APLF program from 2011 (Daling-Hammond et al., 2017). For the second alternative, it is hard to guarantee that retired special education teachers are willing to re-enter the classroom, due to their age and much workload in teaching students with disabilities.

In a word, I recommend CEC to establish a new teacher residency program in special education.

## IMPLEMENTATION

As explained in alternative three above, the major steps to implement this alternative is to establish a partnership between CEC and universities with an online special education program. First, CEC could refer to the structures and characteristics from existing teacher residency programs in California, such as the SFTR program. Second, although CEC has not focused on a partnership with online special education programs in Universities, it established a partnership with American Association of Colleges for Teacher Education (AACTE). This association is working on network to increase the number of qualified teachers, including partnerships with universities. Therefore, CEC could also consult AACTE to establish a new teacher residency program in special education.



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## APPENDIX A: Cost-Effective Analysis for Each Alternative

### **Alternative 1: continue a loan forgiveness program only in special education**

#### *Effectiveness:*

Effectiveness = the total increase number of qualified special education teachers / years (from 1999 to 2006)

Effectiveness (1) =  $5,500/8 = 687.5$

Effectiveness (2) =  $7,500/8 = 937.5$

#### *Cost:*

The CPI Inflation Calculator:

<http://www.in2013dollars.com/us/inflation/2006?amount=200000000>

\*Notes: Inflation rate from 2006 to 2019: 26.09%

Number of years: 13

Average annual inflation rate: 1.80%

Annual CPI for 2006: 201.6

Annual CPI for 2019: 254.202

(CPI: <https://www.usinflationcalculator.com/inflation/consumer-price-index-and-annual-percent-changes-from-1913-to-2008/>)

Cost in 2019 dollars = \$25,218,452.38

#### *Cost-effectiveness:*

Cost-effectiveness = total cost / additional qualified special education teachers

Cost-effectiveness =  $\$25,218,452.38/687.5 = \$36,681.39$

### **Alternative 2: recruit retired special education teachers and give them access to high-quality statewide induction programs**

#### *Effectiveness:*

Effectiveness = the total increase number of qualified special education teachers / years (from 2014 to 2024)

Effectiveness =  $4681/10 = 468.1$

#### *Cost:*

The CPI Inflation Calculator:

<http://www.in2013dollars.com/us/inflation/2006?amount=200000000>

\*Notes: Inflation rate from 2005 to 2019: 30.16%

Number of years: 14

Average annual inflation rate: 1.90%

Annual CPI for 2005: 195.3

Annual CPI for 2019: 254.202

(CPI: <https://www.usinflationcalculator.com/inflation/consumer-price-index-and-annual-percent-changes-from-1913-to-2008/>)

Cost in 2019 dollars = \$113,238,986.18

#### *Cost-effectiveness:*

Cost-effectiveness = total cost / additional qualified special education teachers  
 Cost-effectiveness = \$113,238,986.18/468.1= \$241,911.96

### **Alternative 3: establish a new teacher residency program in special education**

*Effectiveness:*

Effectiveness = the average number of qualified special education teachers \* the number of all similar programs

Effectiveness = 30\*10 = 200

*Cost:*

The cost analysis is based on the cost in the SFTR program and the tuition of online special education program in California.

Table 2 the capital cost in the SFTR

<b>Categories</b>	<b>Amount</b>
Tuition for graduate programs in education at the USF	\$33,000
Tuition for graduate programs in education at Stanford University	\$48,000
Living stipend	\$13,500
Education award	\$6,000
Mentoring teachers	\$2,500
Average administrative fee	\$36,300

Sources: Learning Policy Institute, 2016; American Educator, 2017

Except the tuition, the cost per additional qualified special education teacher in the SFTR program in 2016 dollars = 13,500+6,000+2,500+36,300 = \$58,300

Since the cost above is in 2016 dollars, I use the CPI Inflation Calculator to estimate it in 2019 dollars: <http://www.in2013dollars.com/us/inflation/2006?amount=20000000>

\*Notes: Inflation rate from 2016 to 2019: 5.91%

Number of years: 3

Average annual inflation rate: 1.93%

Annual CPI for 2005: 240.007

Annual CPI for 2019: 254.202

(CPI: <https://www.usinflationcalculator.com/inflation/consumer-price-index-and-annual-percent-changes-from-1913-to-2008/>)

Cost in 2019 dollars = \$61,748.10

The tuition of online special education program in California is approximately \$20,000 on average in 2019 dollars (MSEPFG, 2019).

The total cost in 2019 dollars = the cost per additional qualified special education teacher \* the estimated number of additional qualified special education teachers  
 = (61,748.10+20,000)\* 300 = \$24,524,430

*Cost-effectiveness:*

Cost-effectiveness = the cost per additional qualified special education teacher in 2019 dollars  
 $= 61,748.10 + 20,000 = \$81,748.10$