

Learning Languages in Cyberspace:

A Case Study of World Languages Courses in State Virtual Public Schools

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Abstract

Learning foreign languages has not been a priority of U.S. K-12 education. National enrollment rate in World Languages courses remains low due to lack of funding, course offerings, and qualified teachers. The rapid development of virtual education in recent years provides potential solutions to challenges faced by World Languages programs but stakeholders also question the effectiveness of the virtual classroom. This mixed-methods case study provides an overview of World Languages programs in state virtual public schools nationwide and examines specifically North Carolina Virtual Public School (NCVPS) and its World Languages program. Analyzing the course offerings, enrollment pattern and enrollment changes of the NCVPS World Languages program over the last decade, the study finds that the program has made less commonly taught foreign languages more accessible to students and has benefited students from rural school districts in its initial years. The survey responses of NCVPS World Languages teachers along with four expert interviews reveal that the online program enjoys more resources such as private donation and partnership with universities compared to face-to-face classrooms. Many teachers expressed that the online and part-time nature of the program give them great flexibility. Analysis of teacher survey response also finds that holding students accountable is among the greatest challenges of virtual learning. Teacher opinions are mixed regarding whether learning a language online is better than learning in face-to-face classrooms.

Terminology

World Languages: Although there is a lack of consensus among the states regarding the subject name of foreign languages, this paper uses the term “World Languages” to refer to the learning of foreign languages in the K-12 education context.

Local Educational Agency (LEA): In North Carolina, a school district is referred to as Local Educational Agency (LEA) in legislative documents. This study uses the terms “LEA” and “local school district” interchangeably.

Commonly taught languages: This term is used by North Carolina Department of Public Instruction to refer to foreign languages that have traditionally be taught to students. These include Spanish, French, Latin and German.

Less commonly taught languages: This term is used by North Carolina Department of Public Instruction to refer to foreign languages that have not been traditionally taught to students. This term refers to any foreign language that is not mentioned above as commonly taught languages.

Introduction

Research has consistently shown that learning a foreign language has significant academic and cognitive benefits for students (Mitchell, Pardino, Yermakova-Aguiar, & Meshkov, 2015; Marian & Shook, 2012; Taylor, 2004; Stewart, 2005). Policymakers have also pointed out that mastering a language other than English is a practical need for every world citizen in the age of globalization (Committee for Economic Development, 2006; Commission on Language Learning, 2017). However, American students fall behind in foreign language learning compared with peers in the rest of the world (American Councils for International Education, 2017; Eurostat, 2017). Lack of federal funding, resources, course offerings and qualified teachers all contribute to the low enrollment rate in World Languages courses in the United States (U.S. Department of Education; Pufahl & Rhodes, 2011; Swanson, 2012).

In the meantime, the booming of virtual schools in recent years holds promise as an alternative for this generation of students, who grow up as “digital natives,” and give access to a wide range of courses that they otherwise might not be able to take. Because many of the virtual schools are charter schools run by for-profit education companies, some people have questioned their motives and effectiveness. But there are also currently 25 state virtual public schools which are publicly funded and served over 523,000 students in academic year 2015-16 (Gemin & Pape, 2017). Enrollments in online courses have been on the rise nationwide as technology continues to develop and government policy advocates for an open system with choices (Barnum, 2017). However, research has also raised concerns about the effectiveness of the cyber classroom, and whether a foreign language can be acquired in a distant learning environment with limited direct interaction (Karetnick, 2015).

This study first offers a brief background on the current state of World Languages courses in state virtual public schools, followed by a case study on North Carolina Virtual Public School (NCVPS) and its World Languages program. The case study focuses on three aspects: firstly, the impact of NCVPS World Languages program on North Carolina World Languages education; secondly, the effects of NCVPS World languages program on urban and rural school districts; and lastly, the benefits and challenges of learning foreign languages online as identified by NCVPS World Languages teachers and administrators. Future research directions and policy recommendations are provided based on the findings of the case study.

Literature Review

Current State of K-12 World Languages Education in the U.S.

Learning a second language in primary and secondary school can be cognitively and practically beneficial for students. Research has demonstrated that second language learning is correlated with higher academic achievement on standardized tests (Taylor, 2004), increasing math and reading ability (Stewart, 2005) greater intercultural awareness (Mitchell et al., 2015) and improvements in cognitive skills (Marian & Shook, 2012). Although English continues to be the lingua franca for world trade and diplomacy, many policy makers and research organizations have emphasized the need for an educational system that prepares students to become linguistically competent world citizens in the age of globalization (Committee for Economic Development, 2006; National Research Council, 2007). The American Academy of Arts and Sciences report (2017) notes that mastering foreign languages, in addition to English, is critical to success in business, research and international relations in the 21st century. The report also highlights the need for bilingual and multilingual professionals in order to provide social and legal services for a changing population (American Academy of Arts and Sciences, 2017).

Despite the many tangible and practical benefits of foreign language learning, the study of World Languages has not been considered a critical component of K-12 education in the United States. Currently, only seven of the 50 states and the District of Columbia require the study of a foreign language other than English for high school graduation for all students (O'Rourke, Zhou, & Rottman, 2016). American Councils for International Education (2017) found that in the academic year of 2014-15, the national foreign language enrollment rate was only 19.66%. Although this figure represents a slight increase from the 18% national enrollment rate in academic year 2004-05 (Committee for Economic Development, 2011), it illustrates a

great disparity in foreign language education when compared to other western countries. In the European Union, 95.8% of students learn English as a second language and 59% of secondary school students studied two or more foreign languages in 2015 (Eurostat, 2017).

Challenges in World Languages Education

Many factors contributed to the low enrollment rate in World Languages in the United States. Scholars have noted that students in the U.S. lack the intrinsic motivation to learn a second language largely because of the objective reality that English is the lingua franca of the world (Stein-Smith, 2016). Despite the influx of immigrants speaking languages other than English, the reemergence of the English-only movement in the past two decades has led to the passage of state legislations that mandate English-only instruction as well as budget cuts for bilingual and English as Second Language (ESL) programs (Borden, 2014).

The lack of motivation to learn a foreign language and the conservative push for monolingualism translate into budget cuts on World Languages programs as well. Most notably, the Foreign Language Assistance Program (FLAP), which was the only federally funded program that exclusively targeted foreign language instruction in elementary and secondary schools, was defunded in 2012 (U.S. Department of Education, 2014).

World Languages course offerings are a key factor influencing enrollments. According to a national survey conducted in 2008, there has also been an overall decrease in the offering of second language courses among schools (Pufahl & Rhodes, 2011). Only 15% of public elementary schools offered foreign languages courses in 2008, down from 24% in 1997. In secondary schools, the figure dropped from 86% to 79%. No report or literature currently available indicates an increase of foreign languages course offerings in the past ten years.

Another challenge of K-12 foreign language education is the teacher shortage. Research indicates that language teaching positions (including ESL teachers) are the most difficult to hire (Swanson, 2012). A national report in 2017 identified teacher shortage as one of the biggest obstacles to improved language learning, citing that 44 states and the District of Columbia faced difficulties hiring enough World Languages teachers than any other subject (American Academy of Arts and Sciences, 2017). Moreover, it is also important to consider whether available World Languages teachers are well qualified, as one recent study reveals that oral skills and colloquial usage of the foreign language are not sufficiently covered in teacher training (Vold, 2017).

The urban-rural divide in educational resources and outcome (Yadavalli, Waldorf, & Florax, 2017; Logan, Minca, & Adar, 2012) is also present in the field of foreign language learning. Fogle and Moser (2017) note that foreign language and ESL teaching face challenges in the rural south due to local language ideologies, budgetary considerations, and marginalization of languages course as a result of emphasis on other curricular areas such as math and science.

Virtual Education and Cyber Classrooms

Meanwhile, virtual education for K-12 students has evolved rapidly despite surrounding controversies. It is estimated that 2.7 million students took roughly 4.5 million supplemental online courses during the 2014-15 school year (Herold, 2017). In 2015, 26 states operated publicly funded online schools, while 311 full-time charter and private virtual schools ran across the country (Karetnick, 2015).

The vigorous growth of online classrooms is accompanied by myriad of research investigating their effects and benefits. Barbour and Reeves (2009) pointed out that many claimed benefits of virtual schools are usually based on perceptions of those involved in virtual education (teachers, administrators and students) rather than robust quantitative research. They

articulate that the perceived benefits of virtual schools include increasing educational access, improving student outcomes and allowing for educational choices (Barbour & Reeves, 2009). Other research demonstrates that virtual schools can expand course offerings, provide students opportunities to take remedial class and generally operates on a lower per student cost (Cavanaugh, Barbour, & Clark, 2009; Christensen, 2008; Berge and Clark, 2005). These perceived benefits could potentially resolve the challenges that classroom World Languages program faces as discussed earlier in this paper.

However, online education faces its own challenges such as high start-up costs and the rural-urban digital access divide (Barbour& Reeves, 2009). Virtual schools also have higher drop-out rate compared to brick-and-mortar schools and many students take online class for credit-recovery (Barbour and Reeves, 2009). Research based on quantitative analysis of student outcomes consistently shows that students in online classrooms performed worse than their counterparts in traditional classrooms (Heissel, 2012; Lueken & Rittner, 2012; Raise Your Hand Texas, 2012). Notably, a 2015 report released by Stanford University’s Center for Research on Education Outcomes (CREDO) finds that students in online charter schools nationwide perform significantly worse on standardized tests compared to their counterparts in traditional classrooms (Woodworth et al., 2015).

State Virtual Schools and World Languages Education

It is important to remark that virtual schools vary wildly in types. Clark (2001) categorized seven types of virtual schools, including state-level virtual schools (“state-sanctioned”), college and university-based, consortium and regionally-based, virtual charter schools, private virtual schools and lastly for-profit online course vendors. Since these schools

have different methods of delivery and different funding structures, their targeted students and effects are distinct (Gemin & Pape, 2017) and should be considered separately.

Among the various types of online learning institutions mentioned above, state virtual schools play a unique role in the virtual learning landscape. The oldest state virtual public school, Florida Virtual School, dates back to 1997. Proliferated across the southeastern and midwestern U.S., state virtual schools are publicly funded but vary in modes of operation, with the possibility of being run by the state education agency, nonprofit organizations, higher-education institutions (Gemin & Pape, 2017) or even exist in the form of a network of online schools (e.g., Texas Virtual School Network). Generally, state virtual schools serve as an intermediary. They develop courses or obtain course contents from online vendors before supplying those courses directly to school districts, who make the decision of enrolling students in online courses (Gemin & Pape, 2017). Research on state virtual public schools has mainly focused on evaluating pilot programs or credit recovery courses (Stallings et al., 2016; Banks, Bodkin & Heissel, 2011). Students enrolled in online courses tend to drop out significantly more frequently compared to face-to-face classroom students. Personal learning skills, course design and environment supports are all important predictors of student dropout rate (Lee & Choi, 2011).

Current literature on online language courses usually examines programs in the higher education level. Interestingly, the majority of findings have shown that online language education is as effective as language courses taught in traditional classrooms (Lin & Warschauer, 2015). However, Lin and Warschauer (2015) suggest that many studies measuring online language learning focus on achievement rather than proficiency. Some researchers have raised concerns about students' capacity of self-regulation and motivation for opting to take the

language online (Queen& Lewis, 2011). Others point to the lack of immediate feedback and assistance as a common source of frustration for languages students while teachers often feel challenged to adequately support oral communication that is critical to language learning (Oliver, Patel, & Townsend, 2010). Whether these findings apply to K-12 and specifically high-school online language courses awaits further investigation.

On the other hand, research on K-12 virtual schools focuses on student performances in Algebra and English courses. Student enrollment and performances in online World Languages courses remain an uncharted territory. This is largely because student performances in language courses are harder to quantify and the fact that the states do not require End-of-Course (EOC) Test for foreign languages. Nonetheless, virtual schools are seeing increasing student enrollment in World Languages courses. Gemin and Pape (2017) have noted in their annual report that World Languages is experiencing the largest enrollment increase among all subjects, accounting for more than 11% of all course enrollment in academic year 2015-16, up from less than six percent in academic year 2014-15. Such a significant increase calls for more in-depth research on effects and outcomes of online World Languages courses in the K-12 virtual education context.

Methodology

Research Questions

This study uses a mixed-methods approach to examine the national and local landscape of World Languages program in state virtual public schools and explore the role and impact of state virtual public schools in World Languages education.

Specifically, the study seeks to answer the following questions:

- 1) What is the current state of online World Languages courses in national virtual public schools and in NCVPS specifically?
- 2) How does the availability of online World Languages courses influence World Languages education in North Carolina, especially the course enrollments in the rural school districts?
- 3) What do school administrators and online language teachers see as the benefits and challenges of teaching world languages online?

State Virtual Schools Nationwide

The study first examines different types of state virtual schools in the United States and present descriptive data on their World languages course offerings. Course information data and information about state virtual school operation mode were collected from official websites of each state virtual schools and through consultation of related state laws. The study uses data compiled by Germin and Pape (2017) to examine whether there is a correlation between the number of world languages offered and the number of local and district schools that each state virtual school serves. Using O'Rourke et al (2016)'s state-by-state summary of high school

graduation requirement, the study also examines whether states that require high school students take world languages have more World Languages course offerings in their state virtual schools.

North Carolina Virtual Public School as a Case Study

Following the brief presentation of national background, this paper presents a case study of the World Languages program of North Carolina Virtual Public School (NCVPS).

North Carolina Virtual Public School is currently the nation's second-largest state virtual school, after the Florida Virtual School (FLVS). NCVPS was funded by the North Carolina General Assembly in 2005 and officially launched in summer 2007. Over the years, enrollment has consistently increased, from less than 17,500 to more than 58,000 in academic year 2016-17. NCVPS serves all 115 school districts in North Carolina, plus over 20 charter schools (overall more than 900 schools). Unlike FLVS, NCVPS is a part-time supplementary online program which does not grant high school diploma. Students enroll through their districts and NCVPS teachers work part-time. Currently, the majority of state virtual schools adopt the part-time supplemental model like NCVPS (Gemin & Pape, 2017). Studying NCVPS could therefore provide insights and inform education policy that might be applicable to many other state virtual public schools.

In addition, NCVPS also has a large World Languages program, offering 8 languages and 25 courses. The average annual enrollment during the past three years is over 9,000, amounting to about 3.5% of North Carolina's total World Languages enrollment.

The case study focuses on three aspects of the program: firstly, the effect of NCVPS World Languages program on North Carolina World Languages education; secondly, NCVPS World Languages program's impact on World Languages enrollment in rural and urban school

districts and lastly the experiences of the World Languages teachers in the program, juxtaposed with the opinions of school administrators.

Data for Case Study

NCVPS provided the enrollment data of its World Languages program from 2007 to 2017. Statewide total World Languages enrollment data (2004-2014) came from the North Carolina Public School Statistical Profile. Data from the National Center for Education Statistics (NCES) was used to estimate the overall student population.

Four expert interviews were conducted with the NCVPS World Languages program director, outreach director, research director, and the World Languages consultant of North Carolina Department of Public Instruction. Each interview lasted about 30 minutes during which the researcher asked questions about the funding for world languages programs, course offerings, enrollment changes and teacher retention.

Lastly, a survey was sent out to the 90 world languages teachers at NCVPS, asking about their teaching experiences, qualifications, and reasons for working at NCVPS. The last part of the survey had two open-ended questions asking the teachers to discuss challenges they have faced and comparing the online course to face-to-face classroom teaching. Responses to the open-ended questions were coded using NVivo 11. The teachers' responses were cross-examined with the interviews of school administrators to see if the opinions of the two groups are consistent.

Findings

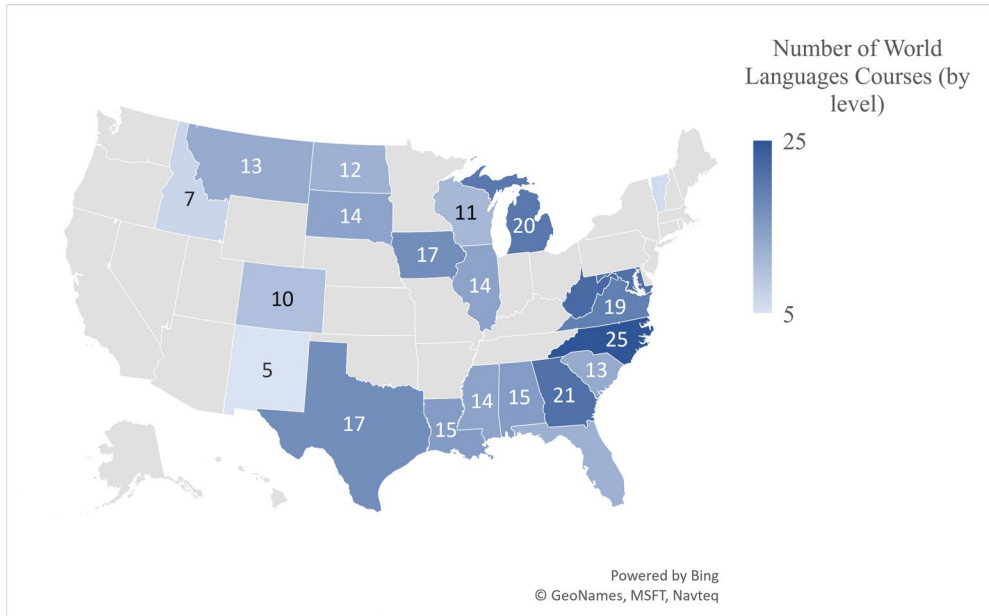
State Virtual Public Schools in the U.S.

State virtual schools have various types of funding models (Stedrak, Ortagus, & Wood, 2012) and operation modes. As virtual learning becomes a topic of heated discussion in recent years, various state legislations have been passed, and state virtual schools undergo constant changes. Some have turned into 501(c) nonprofit organization and some become virtual charter schools operated by for-profit companies. Notably, the Utah Electronic High School was closed in 2017 due to increasing competition from other online course providers.

World Languages courses and state virtual public schools.

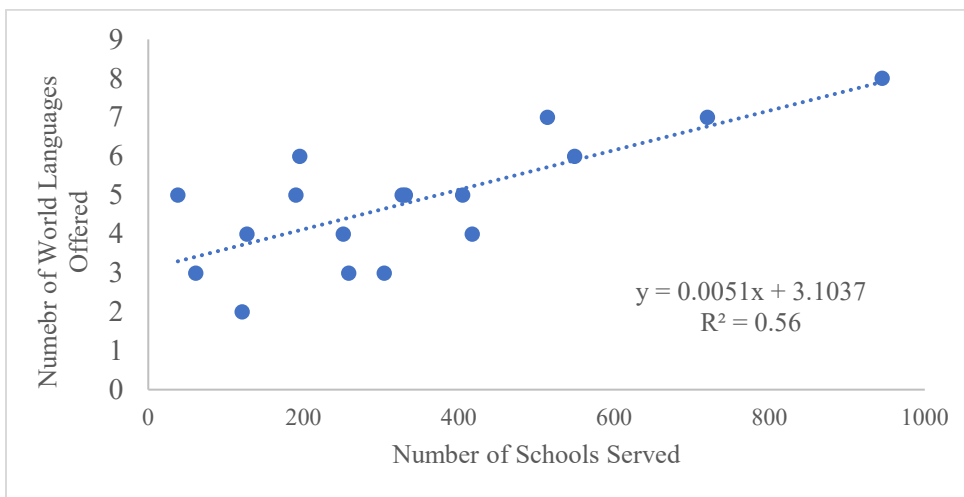
Appendix A provides a summary of World Languages course offerings of the 26 state virtual schools (including Utah Electronic High School) as well as each school's operation mode and each state's high school graduation requirement regarding World Languages as of 2018.

The map below (Figure 1) is a visualization of state virtual public schools and number of World Languages courses they offer. The numbers reflect course offerings by language levels (for example, French I and French II count as two courses; each level of a language takes one year to complete). As Figure 2 shows, the number of World Languages offered is positively correlated ($R^2=0.56$) with the number of district schools that state schools serve when excluding the Florida Virtual School (FLVS) as an outlier. As the largest state virtual public school in the U.S. serving more than 3200 schools, FLVS offers only four foreign languages and in total 12 World Languages courses.



Note: Data of Hawaii, Missouri and Utah state virtual schools are not available

Figure 1. State virtual public schools World Language courses offerings. This figure illustrates the number of World Languages courses offered by each state virtual public school.



Note: The number of schools served by Texas, Louisiana, Maryland, Hawaii, Missouri, South Dakota and Utah state virtual schools is not available. Florida is excluded as an outlier.

Figure 2. Scatterplot of the scale and the number of World Languages offered by each state virtual schools.

On average, state virtual public schools offer four foreign languages and 14.4 courses (by levels). Every state virtual school teaches Spanish courses. French, Latin, German and Chinese are also widely offered with only a few exceptions, as listed in Table 1. The less commonly taught foreign languages do not seem to become more available to students online: Only nine states offer Japanese courses in their virtual public school; North Carolina is the only state that offers Russian and Arabic, and Montana is the only state giving students opportunity to take Level I Irish online.

Table 1

World Languages offerings of state virtual schools by language

Language	Number of state virtual schools offering this language (out of the 23 schools)	Percentage
Spanish	23	100%
French	22	95.7%
Latin	20	87.0%
German	19	82.6%
Chinese	18	78.3%
Japanese	9	39.1%
American Sign Language	9	39.1%
Arabic	1 (North Carolina)	4.3%
Russian	1(North Carolina)	4.3%
Irish	1(Montana)	4.3%

High school graduation requirement and virtual public school offerings.

Cross-examination of state virtual schools' World Languages offerings with state high graduation requirement does not find strong correlation between the two. The sample size is small. Among the states that have a virtual public school, Michigan is the only one that requires one year of world language study. Sixteen states have a fine arts or professional requirement that students can take World Languages courses to fulfill, but World Languages are not required for high school graduation in those states. The remaining eight states have no language requirement and do not accept World Languages courses as fine arts credits.

As Table 2 shows below, Michigan, with its World Languages requirement, has a strong online World Languages program, featuring seven different languages and 20 different courses. The states that allow students to use World Languages to fulfill the fine arts or professional requirement do not on average offer significantly more World Languages courses through their virtual public schools than states with no World Languages requirement. It is worth pointing out that there is great disparity of World Languages course offerings within these last two categories. For example, among the states that accept World Languages as a fine-art credit, North Carolina has the largest and most diverse World Languages course offerings (8 languages and 25 courses) in the nation while New Mexico's virtual public school only teaches two languages and offers five courses. Iowa, which offers 17 World Languages courses in 5 different languages in its state virtual public school, does not require or accept World Languages as fulfilling the fine arts credit for high school graduation.

It is also important to note that high school graduation requirement of each state represents the minimum requirement for graduation. Some state universities require students to take at least a year of a foreign language in high school in order to be eligible to apply (e.g., the

state universities of North Carolina and Vermont). Students in these states wishing to pursue a college degree have to take World Languages courses even if they do not need these credits for high school graduation.

The current analysis therefore shows that the overarching state education policy on World Languages requirement does not have a significant impact on how many World Languages courses in the respective state virtual public school offers. The decision to offer more or less World Languages courses is likely driven by other factors such as student demand and online teacher availability.

Table 2

World Languages offerings in state virtual public schools and state high school graduation requirement

	State with World Languages requirement (only Michigan)	States accepting World Languages as fulfilling Fine Arts requirement (n=16)	States with no World Languages requirement (n=8)
Average number of World Languages Courses	20	14.4	13.5
Average number of World Languages	7	4.9	4.9

Case Study of North Carolina Virtual Public School

The World Languages program in NCVPS.

The World Languages has been one of the most popular programs of NCVPS since its inception in summer 2007 (academic year 2006-2007). During this pilot period, the World Languages program offered twelve courses in four languages (French, Spanish, Latin and German). There were 993 course enrollments in World Languages, tallying more than fourteen percent of total NCVPS enrollment in that summer. From 2007 to 2017, as the World Languages program expanded and developed more languages courses, its enrollment consistently constituted 15% to 20% of all NCVPS enrollment. Academic year 2008-09 was exceptional as the number reaches an all-time high of 25.8%. This high ratio of World Languages enrollment marks NCVPS as an exception to other state virtual public schools in the nation. Gemin and Pape (2017) indicate that before 2015, World Languages courses enrollment tallied only about six percent of all enrollment in state virtual schools nationwide.

In fact, the World Languages program drove the enrollment growth of NCVPS in the school's initial years. Figure 3 plotted the annual growth of NCVPS World Languages and that of NCVPS total enrollment. As the figure shows, in the first two years, enrollment in NCVPS World Languages program outgrew total NCVPS enrollment. But from 2009 on, total enrollment growth has been greater than the World Languages program growth (except for academic year 2015-16). According to NCVPS administrators, this is likely because the Occupational Course of Study (OCS) courses had replaced World Languages program as the fastest-growing program within NCVPS.

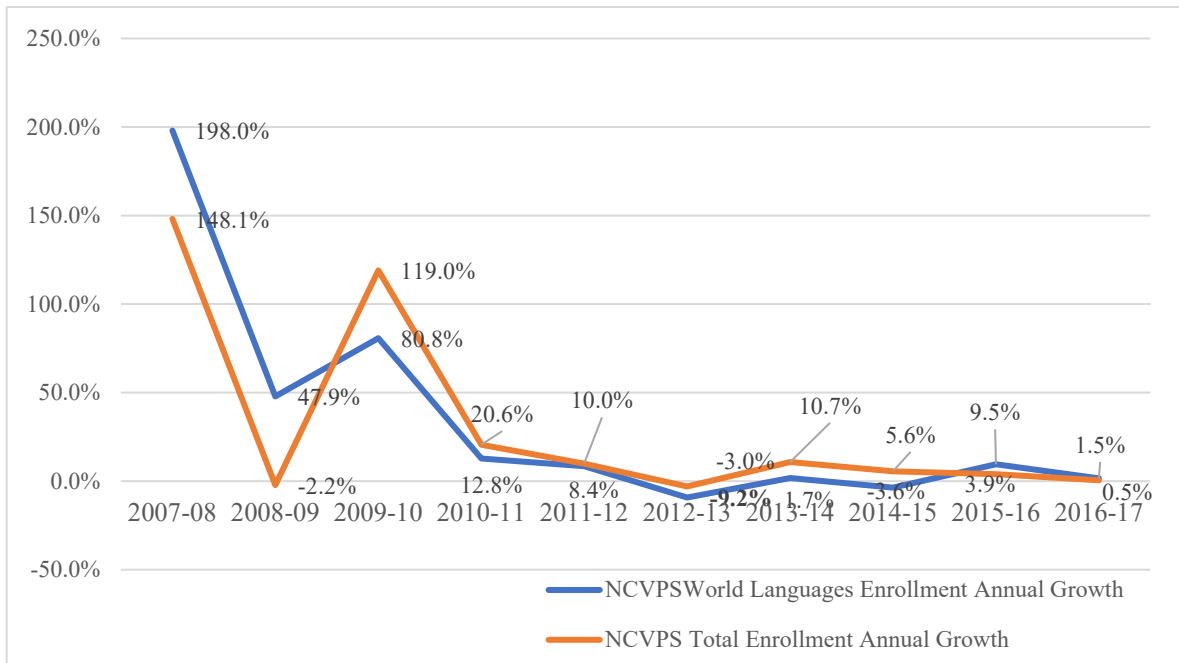
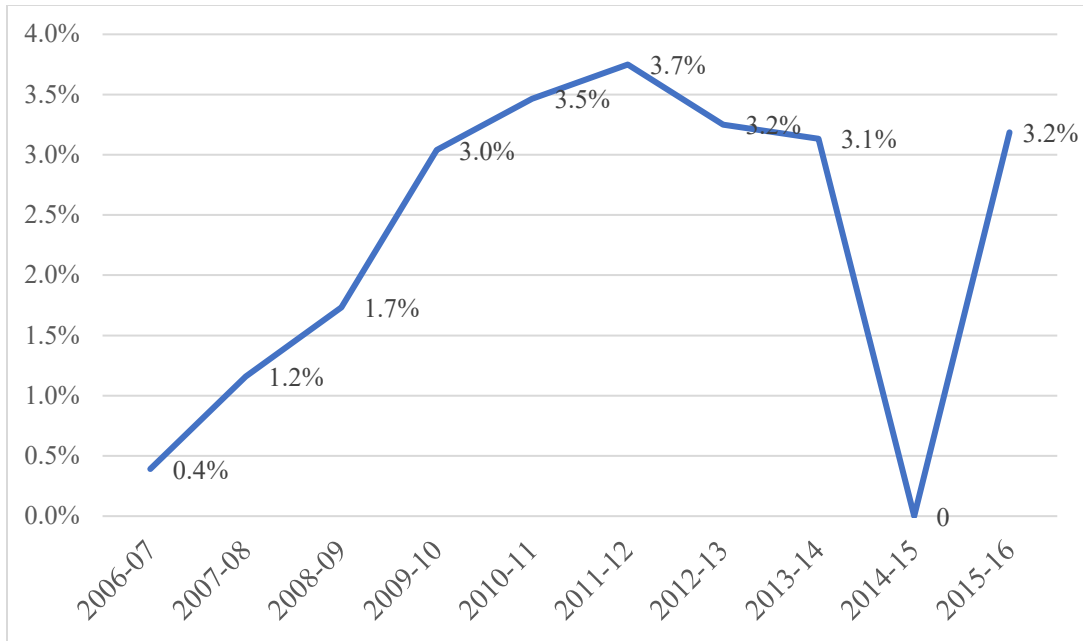


Figure 3. Annual growth of NCVPS World languages program enrollment and NCVPS total enrollment.

Impact of NCVPS on North Carolina World Languages education.

The percentage of North Carolina K-12 students enrolled in a foreign language in academic year 2014-15 is 19.7%, which is the same as the national average enrollment rate (American Councils for International Education, 2017). The study looks specifically at World Languages enrollment in secondary schools because NCVPS only allow students from grade 6 and above take its courses for high school credit.

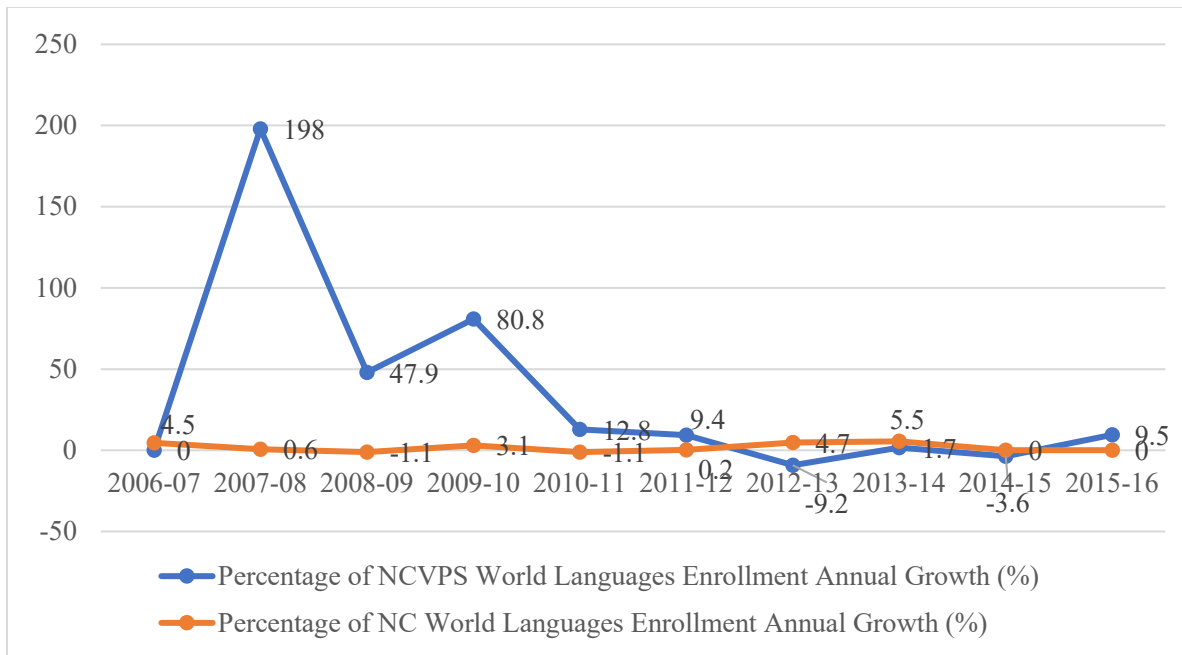
Figure 4 shows the percentage of NCVPS World Languages enrollment to total North Carolina World Languages enrollment from 2006-2016. The percentage grew from 0.4% in the beginning to 3.7% in 2012 and has since remained stable at around 3%. Although 3% does not seem like a large number, it actually represents more enrollments than any of the 115 school districts in North Carolina.



Note: The total World Languages enrollment of North Carolina in year 2014-15 is not available.

Figure 4. Percentage of NCVPS World Languages enrollment to total NC World Languages enrollment.

Comparing the fluctuation of enrollment growth rate over the years reveals more about the NCVPS World Languages program. From 2006 to 2016, the World Languages enrollment in North Carolina has an average yearly growth of 1.7%, whereas the NCVPS World Languages program has a compound average annual growth of 38.5%. Figure 5 shows the annual growth by years for World Languages enrollment in NCVPS and in North Carolina. The online enrollment does not mirror the trend of total enrollment. When enrollment in NCVPS decreases in academic year 2012-13, the total enrollment in the state increased, whereas in academic year 2008-09 and 2010-11, online World Languages enrollment increased substantially despite the declines in total enrollment.



Note: because total enrollment of year 2014-15 is not available, the annual growth in year 2015-16 is the compounded annual growth rate of 2014-16.

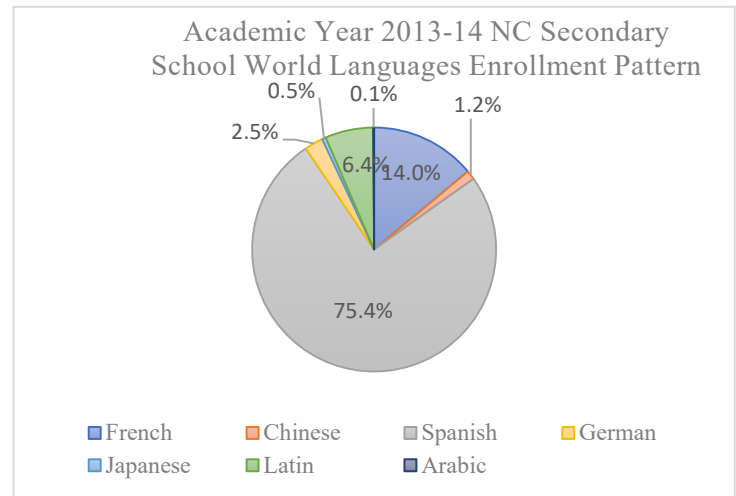
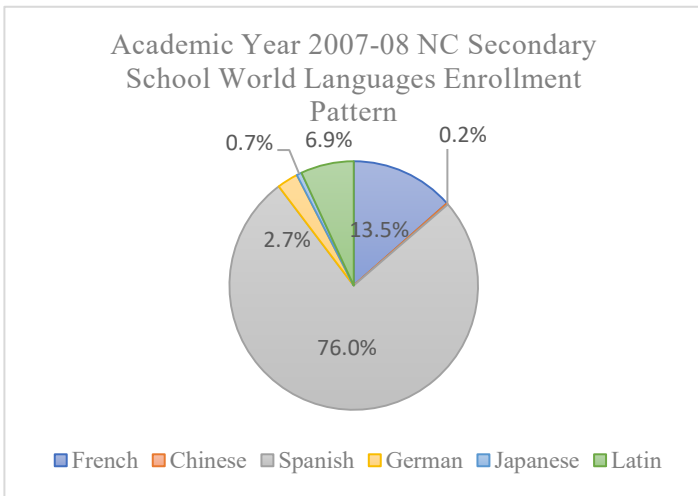
Figure 5. The annual growth rate of World Languages enrollment in NCVPS and in North Carolina.

Impact on specific language subjects.

This section of the study examines enrollments in each foreign language offered by NCVPS (except for Russian, for which the enrollment data were not provided) and compares them with the total state enrollment of each language. Before diving into specific subject, the study first offers an overview of World Languages enrollment pattern in North Carolina and in NCVPS.

World Languages enrollment pattern in North Carolina did not vary much from 2007 to 2013. As Figure 6 shows, Spanish remained the most frequently studied foreign language, accounting for more than 75% of all enrollment of the seven languages examined. French and

Latin are the next most frequently studied. Over the period of time examined, Chinese experienced a significant growth in enrollment, growing from 0.2% to 1.2% of all World Languages enrollment. Japanese enrollment remained a small fraction of the total enrollment. Arabic was first offered in academic year 2010-11 and composed only 0.1% of all World Languages enrollment in academic year 2013-14.



Note: There were more than seven languages taught in NC, but only enrollments in the seven languages offered by NCVPS are examined here.

Figure 6. North Carolina secondary school World Languages enrollment pattern, academic year 2007-08 and academic year 2013-14.

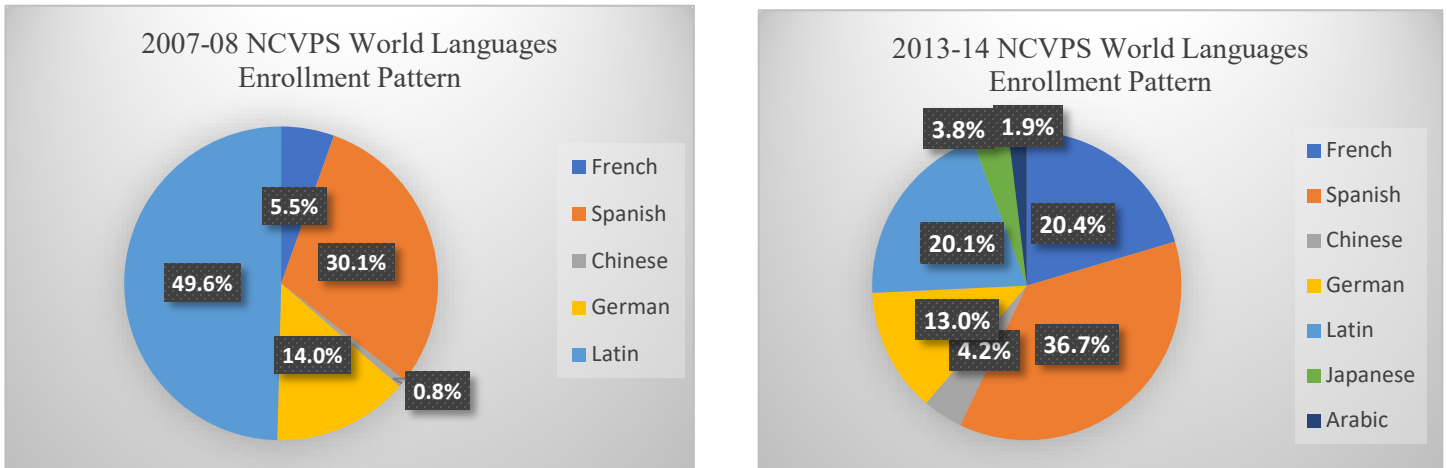


Figure 7. NCVPS World Languages enrollment pattern, 2007 and 2013.

Enrollment pattern in NCVPS shows more variances over the years as the online World Languages program expanded (Figure 7). In 2013, about 10% of the NCVPS languages enrollment was in less commonly taught languages, whereas only 1.8% of state total languages enrollment was in those languages. NCVPS enrollment in less commonly taught languages constantly increased whereas online enrollments in Spanish and Latin fluctuated during the years examined. This could be attributed to the fact that less commonly taught languages like Chinese, Japanese and Arabic are “hard-to-staff subjects” in the brick-and-mortar classrooms and schools unable to offer these languages have students taking them with NCVPS. Spanish and Latin, on the other hand, have been more widely provided in face-to-face classrooms and most students would only enroll in these languages courses online if they have a schedule conflict (local school districts make their own policy regarding which students are eligible to enroll). Therefore, NCVPS enrollment of these languages might fluctuate more from one year to another.

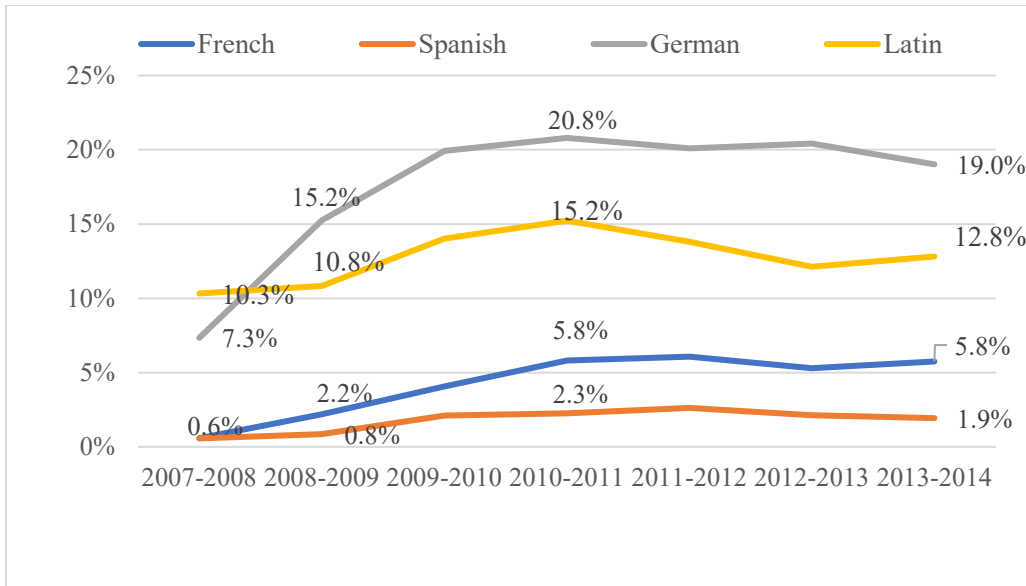


Figure 8. Percentage of NCVPS to state total enrollment by subjects: commonly taught languages.

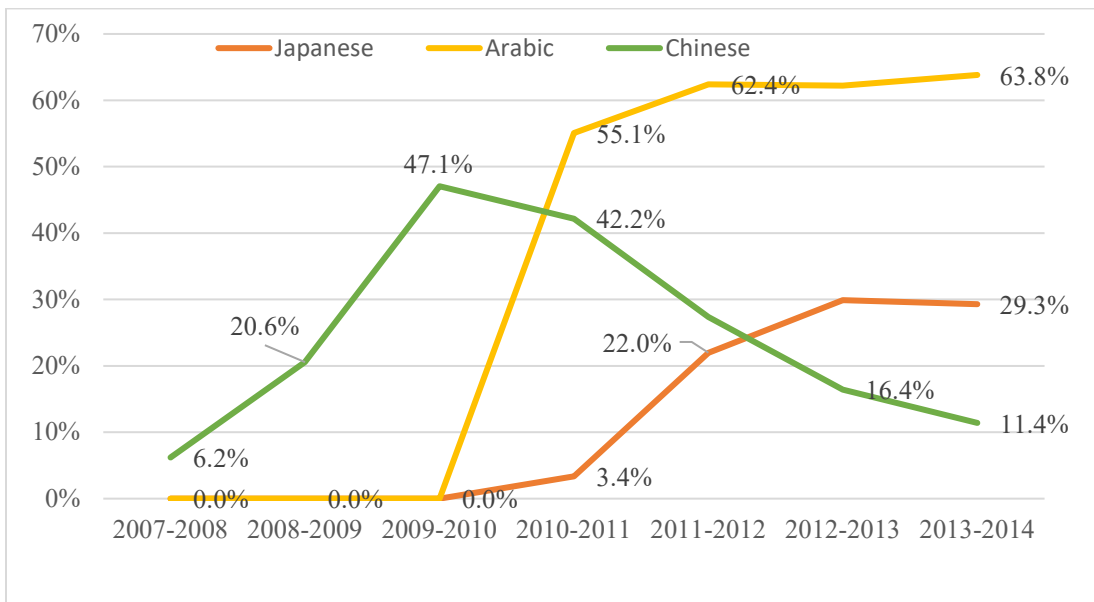


Figure 9. Percentage of NCVPS to state total enrollment by subjects: less commonly taught languages.

Figure 8 and 9 show the ratio of NCVPS enrollment to total state enrollment for each of the seven languages. The ratio varies wildly among different languages. Less commonly taught languages had significantly higher NCVPS to total enrollment ratio than commonly taught languages. In academic year 2013-14, for example, about two percent of public school students learning Spanish in North Carolina learned it online through NCVPS, whereas more than 60% of North Carolina students learning Arabic took the course online through NCVPS. Chinese is a unique example because the number of total students learning this language have increased over the years while the ratio of NCVPS enrollment to state total enrollment dropped from 47.1% in academic year 2009-10 to 11.4% in academic year 2013-14. According to the World Languages consultant of North Carolina Department of Instruction, this change was due to increasing availability of Chinese courses in face-to-face classrooms and by other online providers.

The above analysis therefore shows that students in North Carolina have been taking advantages of the online availability of less commonly taught languages. By offering these languages, NCVPS gives students the opportunity to learn a language that might be unavailable locally, expanding student choices.

However, it is important to point out that although eight languages are taught at NCVPS, there are 17 languages currently being taught in North Carolina (N.C. Department of Public Instruction, 2017). This means that nine other languages are not taught online and students who want to learn those languages could still have limited access if their local school does not offer these languages.

Urban and rural enrollment in NCVPS World Languages courses.

The state legislature intended for NCVPS to provide high-quality education to rural and low-wealth county local schools (NCVPS Annual Report, 2010; N.C. General Assembly, 2011). This section examines whether the NCVPS World Languages program achieves the goal of benefiting rural county schools.

The study uses the North Carolina Rural Center’s most recent classification of North Carolina counties (see Appendix D) to categorize the 115 Local Education Agencies (LEAs) as “Urban”, “Suburban” or “Rural”. The enrollment data of each county were then grouped into and compared across the three categories. Figure 10 shows the World Languages enrollment change for urban, suburban and rural LEAs over the years. Enrollments in urban and suburban LEAs have been on the rise stably. However, enrollment in rural schools dropped during 2011-2014. In fact, 42 out of the 89 rural LEAs had decreased NCVPS World Languages enrollment during that period. The rural enrollment number has never returned to the record-high of 5084 in academic year 2010-11.

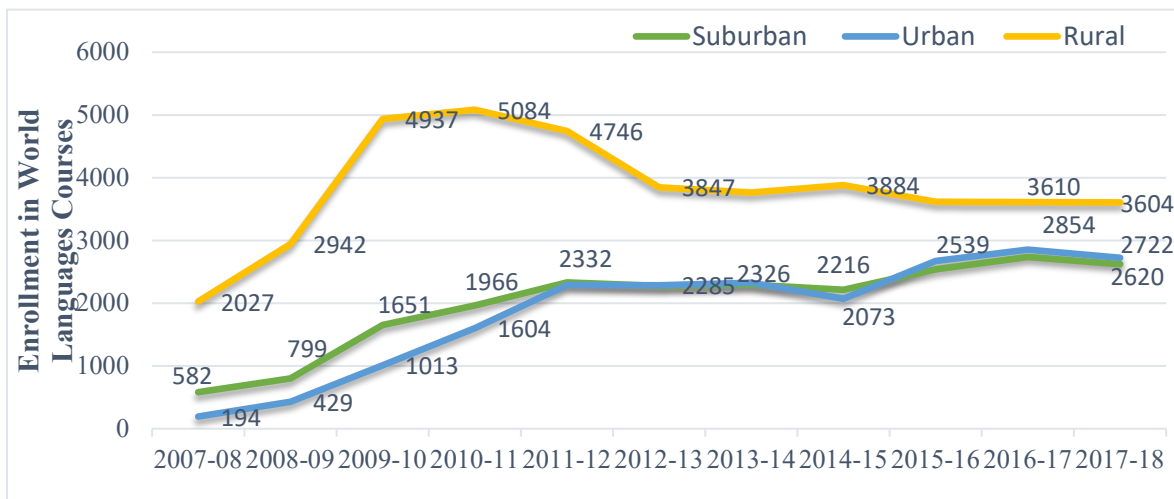


Figure 10. NCVPS World Languages enrollment trends in rural/suburban/urban areas.

The decreasing trend in rural LEAs holds true after considering student population change. Table 3 and Table 4 provide the breakdown of student population and NCVPS World Languages enrollment in urban, suburban and rural LEAs. The student population shifted slightly: 44.1% of students were in a rural LEA during 2007-2011 and the number dropped to 41.7% during 2012-2016. The rural enrollment in NCVPS World Languages experienced far greater declines during the same period, from 63.8% to 42.3%.

Table 3

Geographical distribution of total student population and NCVPS World Languages program (average percentage), 2007-2011

Geographical Category	Total Student Population Distribution Percentage (%)	NCVPS World Languages Enrollment Percentage (%)
Urban	31.4	13.4
Suburban	24.5	20.7
Rural	44.1	62.0

Table 4

Geographical distribution of total student population and NCVPS World Languages program (average percentage), 2012-2016

Geographical Category	Total Student Population Distribution Percentage (%)	NCVPS World Languages Enrollment Percentage (%)
Urban	33.3	26.1
Suburban	25.0	26.2
Rural	41.7	42.2

Note: the percentages of NCVPS enrollment data do not add up to 100% because there were enrollments from charter schools and special schools.

To explain the decrease in rural World Languages enrollment would require interviewing each rural district, which is beyond the scope of the current study. But the expert interview with the NCVPS research director provided some insights on what factors could have contributed to the enrollment decrease.

The research director pointed out that in 2011, the North Carolina General Assembly enacted a new funding formula for all local school districts. Before the formula was enacted, the districts were free to enroll in as many students as they want. The new funding formula, however, assigns a state allotment for online courses to each local school district each year based on a projected number of students they would enroll online in NCVPS. School districts have to transfer a portion of the state allotment fund to NCVPS for each of the NCVPS course enrollment they make. It is therefore possible that after the funding formula change, the rural LEAs have adjusted their policy for enrolling students in NCVPS. This is a plausible explanation because urban and suburban enrollment stopped increasing during the same period. Another factor worth considering is that an enrollment in NCVPS World Languages course costs more than an enrollment in other NCVPS subject because World Languages courses involve oral practice sessions. It is possible that local school districts will give priority to enrollments in other subjects rather than having more World Languages enrollment. NCVPS research director also mentioned that school districts might have opted for other online course providers who provide World Languages courses.

Apart from enrollment distribution, the study also investigates whether students in different geographical locations have a different preference for which foreign languages they learn.

Table 5

Average percentage of Urban, Suburban and Rural Enrollment for Each Language, 2007-2016

Population	Percentage of Students in Urban and Suburban School Districts	Percentage of Students in Urban and Suburban School Districts
	57.3	43.7

Language	Average Percentage of Urban and Suburban Enrollment (%)	Average Percentage of Rural Enrollment (%)
Spanish	50.5	45.3
French	44.8	51.8
Latin	45.6	52.5
Chinese	53.4	43.9
German	43.9	53.7
Japanese	54.0	43.0
Arabic	71.2	26.3

Note: the percentages of NCVP enrollment data do not add up to 100% because there are enrollments from charter schools and special schools.

Table 5 lists the average enrollment of each language by geographical location from 2007 to 2016. The table also includes the percentage of student coming from rural and urban/suburban school districts. For all the less commonly taught languages — Arabic, Japanese and Chinese — the majority of enrollments came from urban and suburban school districts, whereas for French, Latin and German, over half of the enrollments were from rural school districts.

This analysis shows that more students from urban and suburban areas learn the less commonly taught languages online than their rural counterparts. Rural school districts, on the other hand, enroll more students in all the commonly taught languages except for Spanish.

In the expert interviews, NCVPS administrators identified two factors that might explain this geographical difference in the enrollment pattern: firstly, urban and suburban school districts offer more commonly taught languages courses in face-to-face classrooms and some school districts do not allow students to enroll in an NCVPS course that is available in their local school (unless there is a schedule conflict); secondly, students in urban and suburban school districts might be more likely to learn or want to learn a less commonly taught foreign language.

Perceived benefits and challenges of NCVPS World Languages courses.

A survey was sent out to the 90 world languages teachers at NCVPS and 33 responses were collected. The response rate for the survey is 36.7%. The open-ended responses of the teachers (n=28) were coded and analyzed using NVivo 11. Expert interviews with the NCVPS World Languages program director, outreach director, and the research director give the perspective of school administrators. Their responses were also included in the analysis.

Among those teachers who responded, twenty-nine are female, and four are men. Twenty-five are white and seven Hispanic. The respondents are across all ages: six are between

25-34 years old, nine between 35-44 years old, 10 between 45-54 years old and eight are over 55 years old. The survey respondents teach six out of the eight total World Languages offered: over half of the respondents teach Spanish, eight teach French and four teach Latin. Three indicate that they teach Japanese. Chinese and Russian each has one teacher respondent. One teacher teaches both French and Spanish and another teaches French, Spanish and Japanese.

The survey (see Appendix D) asked two open-ended question at the end: “What are some of the challenges you have met teaching a foreign language online?” and “If you have taught in a traditional classroom, what do you think are the main differences between teaching online and teaching in classrooms? Which one do you prefer, and why?”

Table 6 lists the recurring themes in the open-ended responses. The analysis that follows discusses the teacher-identified and administer-identified benefits and drawbacks of the NCVPS World Languages program.

Table 6

Codes for recurring themes in the open-ended response (n=28)

Code Name	Definition	Occurrence
Online Learning Benefits	Mentions online features (individual feedback, pronunciations etc.) that are beneficial to students	9
Perception-Attitude	Mentions students’ perception of online courses influence their learning attitudes	7
Delay and Lack of Accountability	Mentions difficulties in monitoring cheating and tracking student learning	17

Lack of Interaction	Mentions lack of face-to-face interaction as a problem of the online learning environment	10
Suitability	Mentions online learning is only suitable students with certain characteristics	10
Face-to-face Same	Mentions Face-to-face learning and online learning as similar in effect or suggest the mix of the two	5
Face-to-Face Superior	Mentions Face-to-face learning as better than online learning	8

Benefits of the online program.

Firstly, the NCVPS World Languages program enjoys resources comparing to traditional programs. The administrators noted that the program had received grants from private organizations such as the Japan Foundation to do subject-specific course development and Japanese teacher recruitment. The foundations have more incentives to award grants to an online program than an individual school district since the nature of the online program enables it to reach a broader student population. In addition, NCVPS is in partnership with other online providers and higher-education institutions, which could provide useful course content and resources. Notably, the German courses at NCVPS are developed and supplied by the Oklahoma State University. The World Languages program director suggested that this is an example of how NCVPS takes advantages of its available resources. Moreover, NCVPS makes its courses available to other virtual schools and non-public students as a way to generate revenue.

Secondly, the online and part-time nature of the work gives world languages teachers greater flexibility: more than half of the respondents identified the ability to work part-time as the main reason they chose to work for NCVPS. Three female teachers highlighted that the part-time schedule better enables them to take care of children and other family responsibilities,

describing the face-to-face setting as “too constricted.” The program also has a relatively high retention rate. Nineteen out of 33 respondents had more than ten years of teaching experiences and worked at NCVPS for more than five years.

The flexible schedule also attracts potential candidates to become certified language teachers: the world languages program director noted that some of the conversational coaches (who are responsible for doing oral practices with students weekly) went through training to become world languages teachers. Moreover, the program director and two survey respondents noted that for the less popular languages like Japanese and Russian, the NCVPS program gives the teachers opportunities to open courses that would be difficult to set up in traditional classrooms because not enough students would enroll in one school.

About a third of teacher respondents expressed positive attitudes towards the online learning environment. Four teachers noted that students get more personalized experiences with online features. One of them wrote:

“Online is great for language learning, because students can hear the repetition as many times as desired, and there is screencast with great grammar explanation.”

Another added,

“There is the opportunity to have individual feedback for recorded speaking assignments, which is often hard to do in face-to-face classrooms.”

A few teachers also emphasized that the online course serve students who are active learners well because they could benefit from “optional, proficiency-based materials” that teachers uploaded online whereas in face-to-face classrooms, teachers have to consider the needs of all students and cater to those who learn relatively slowly.

Two teachers responded that the online classroom benefits teachers, too. One explained that the teacher can focus on the lesson at hand without being distracted by a large group of students. Another expressed:

“The students in the online classroom are more motivated as a whole and MUCH better behaved. I do not have to waste my time writing students up or calling administrators.”

Drawbacks of the online program.

Although the online form gives teachers greater flexibility and reaches wider students population, it sometimes affects the learning process, as demonstrated by teachers’ responses to open-ended questions.

Over half of teachers expressed that there is little accountability for students in the online enrollment. Several teachers noted in particular the usage of online language translator to be troublesome and impossible to regulate. One teacher wrote:

“Monitoring cheating [is the biggest challenge], it is impossible to tell where students are getting the answers and if they are even completing the course themselves.”

Another noted:

“The fact that sometimes they choose to avoid contact is challenging because I am not seeing students daily to see if they are engaged in learning.”

Nearly a third of the respondents noted that students’ perception of the online courses influences the efforts they put in. Students usually prioritize their classroom courses because there is less accountability for online courses and they tend to cram at the last minute. As one teacher wrote:

“The students seemed to get all tangled in the [face-to-face classroom] and leave the online assignments for last or not complete at all.”

Another drawback of the online setting identified by the teachers is the absence of immediate feedback and face-to-face interaction. In an online environment, teachers cannot answer a question on the spot or correct the pronunciation of students. This problem is especially salient in languages courses since a crucial part of language learning is to practice the pronunciation and make sentences. One teacher explained:

“In the traditional classrooms, you have daily practice and feedback. It is hard to gauge student progress in the virtual classroom particularly when students can choose to respond or not respond.”

Although 20 out of 33 teachers agreed that most or all of their students meet the course requirement or make significant progress in the foreign language, eleven mentioned in their written response that to be successful in an online classroom, it requires that students possess certain “qualities” such as self-disciplined, self-directive and independently motivated. Given that students have such qualities, most teachers asserted that students could learn well in both settings. One teacher wrote:

“It takes more discipline and more determination to be online. The teacher is not there pushing him to work, and this is problematic with some students.”

In response to these drawbacks, some respondents suggest that a hybrid learning model or a screening and selection process for students to enroll in online courses could be adopted. A few teachers also wrote in their open-ended responses that a blended classroom might be the best for students to learn languages.

Other findings.

Although some teachers suggested that online features give students personalized-learning, there is little flexibility for NCVPS teachers to personalize the content of the courses for their students. This is because NCVPS requires all World Languages teachers to use the course materials the school has developed and follow the pre-designed syllabus. One question of the survey asked the teachers to evaluate the course materials provide by NCVPS. Twenty-eight out of 33 teachers rated the course materials as “helpful” or “very helpful”. Although teachers are not allowed to modify course materials, a little more than a third of teachers noted that they would add supplementary materials to meet student needs through daily announcement.

Two teachers remarked that they sometimes ran into technical issue with the online textbook. One suggests that it “badly needs redevelopment”. The rest of the respondents did not mention technology issues.

Discussion

With the rapid growth of the virtual learning landscape, numerous organizations have published reports and studies on the effectiveness of virtual schools of various types. But as virtual schools expand and develop more courses in different subject areas, it is necessary for researchers to consider the online learning of different subjects differently. Unlike math and English, which are mandatory for all students, subjects like World Languages are not required by most states and the online availability of these subjects may influence student enrollment. In their *Keeping Pace with K-12 Online Learning* report, Gemin and Pape (2017) observed that online World Languages enrollment has been increasing and is the fastest-growing subject area in state virtual public schools. In treating World Languages as one subject area, however, most current report and research do not look at specific foreign languages offered within the World Languages program. The current research studied both online enrollment of specific languages and of World Languages as a larger subject area.

NCVPS and State Virtual Schools Nationwide: Course Choices and Access

This study examined individual language course offering information from state virtual schools and found that almost all state virtual schools in the nation offer traditionally taught foreign languages like Spanish, French and Latin whereas only a few offer less commonly taught languages. This finding is especially interesting when considered together with findings on NCVPS. NCVPS offers less commonly taught languages such as Arabic, Russian, Chinese and Japanese. Enrollment data analysis shows that for these less commonly taught languages, online enrollment in NCVPS constitutes a high percentage of total enrollment. Although the absolute online enrollment of those less commonly taught languages is still much smaller than online enrollment of popular foreign languages like Spanish, the online availability of less commonly

taught languages benefits students who are interested in taking these languages because they are, as noted by the NCVPS annual report and another research (Swanson, 2012) have noted, especially hard-to-staff in brick and mortar classrooms. The majority of state virtual public schools in the nation, however, do not help expand course choices in World Languages for students, nor do they help solve the problem of lack of qualified teachers who could teach the less commonly taught languages. On the other hand, the study did find that the scale of the state virtual public school is positively correlated with the number of foreign languages they offer. The study did not find correlation between a state's high school graduation requirement (whether it requires World Languages study for students to graduate from high school) and the number of foreign languages its state virtual school offers. Therefore, it is possible that the availability of online languages courses is influenced by demand of students and schools rather than the overarching state policy. As many of the state virtual public schools continue to grow, it is possible that they will be developing and offering more courses that teach less commonly taught languages.

NCVP World Languages Program: Impact on Rural Districts

The case study on NCVPS is the first one looking specifically at the school's World Languages program. Analysis found that the World Languages program has driven the growth of the school's total enrollment in the first two years of NCVPS and enrollment in the program had been increasing every year except for academic year 2012-13. When breaking down the enrollment to urban, suburban and rural school districts, the study finds that World Languages enrollment from rural LEAs closely mirrored the total World languages enrollment. Rural World Languages enrollment constitutes of about 60% of total NCVPS World Languages enrollment from 2007 to 2011. The high and rapidly growing World Languages enrollment from rural LEAs

indicated that there was indeed a demand for online World Languages courses in rural North Carolina and NCVPS had helped fill the needs to some extent.

However, rural enrollment in World Languages dropped continuously from academic year 2011-12 to academic year 2013-14. Specifically, the rural enrollment dropped the most (rural enrollment dropped by 899) in academic year 2012-13, accounting for the only total World Language enrollment decrease in NCVPS' history (total enrollment dropped by 894). Although there might be many reasons behind the rural enrollment decline, the new funding formula enacted in 2011 to require local educational agencies pay for each online enrollment using state allotment likely contributed to the decrease. From academic 2014-15 on, rural enrollment in World Languages has remained relatively stable at around 3600 annually but never reached the all-time high of 5084 in academic year 2010-11. The study could not determine whether the demand of online World Languages courses of rural LEAs had decreased, but it is possible that the 2011 funding formula change has dissuaded rural LEAs from enrolling some of the students who wanted to take a World Languages course through NCVPS.

In addition, the study also revealed that students from rural LEAs have different preference for the foreign language they learn. For the less commonly taught languages, the majority of enrollment came from urban and suburban LEAs whereas for French, Latin and German, the majority of enrollment was by students of rural LEAs. It remains unclear whether this geographical difference in language preference is due to lack of commonly taught languages courses in rural LEAs or because students from urban and suburban districts take more interests in learning less commonly taught languages than their rural counterparts.

NCVP World Languages Program: Perceived Benefits and Challenges

The expert interview and teacher survey responses suggested that the NCVPS World Languages program does help alleviate some of the challenges traditional program face such as course offerings and teacher shortage thanks to its broader reach to students and the online part-time working schedule for teachers.

In a previous research that studies NCVPS courses, Oliver et al., (2010) found that NCVPS students taking World Languages are less likely to indicate that they were succeeding or learning more online comparing to students taking five other subjects. In response to the student rating, World Languages teachers in the study remarked that foreign language is among the most difficult subjects to learn in face-to-face classrooms and that lack of interaction online made the subject even more challenging. The present study also surveyed NCVPS World Languages teachers and their responses showed that teachers' attitudes towards learning languages online is more mixed comparing to the study of Oliver et al. Some teachers maintained that lack of direct interaction means they could not give students immediate feedback and hold the students accountable. Many teachers identified students' use of online translators as a big problem. Teachers suggested that it requires student motivation and self-discipline to succeed online, which is consistent with the findings of Oliver et al., (2010). However, some teachers noted that the online learning environment also promises better individualization of the learning process for students and fewer distractions for teachers. Moreover, previous scholarship (Simon 2008, Tuttle 2007) have noted the potential of web resources to expose students to authentic foreign language materials, which is reflected in the teacher survey responses of this study. A few teachers noted that they provide supplementary and optional online resources like video clips in the foreign

language they teach for their students despite the fact that NCVPS requires teachers to follow the pre-designed course syllabus and materials.

Policy and Practical Implications

State Virtual Public Schools

State virtual public schools nationwide could develop more online courses that teach less-commonly taught languages. As the case study of NCVPS showed, supplementary state virtual public schools could play an important role in increasing World Languages enrollment, filling the teacher shortage and closing the urban-rural access divide. This is especially true for the less commonly taught languages that are harder to staff and with relatively scattered student interests. Making less commonly taught languages available online would allow individual schools to save resources and energy in finding teachers and opening less popular courses. The first part of the current study found that the majority of state virtual public schools in the U.S. only provides three to four most popular foreign languages. The study therefore suggests developing more online courses that teach less-commonly taught languages to expand course choices for students.

NCVPS and Local School Districts

North Carolina policymakers could consider allocating more online enrollment slots to rural school districts. Rural districts tend to have large demand for online courses, as demonstrated by the high rural enrollment in NCVPS World Languages courses during the school's first few years. Expert interview reviews that this is because rural districts have fewer course offerings in general. Rural schools also seem to be more susceptible the funding formula

change in 2011 and rural enrollment in World Languages has dropped since then. Since one goal of NCVPS is to help ensure equal access to education for rural and urban school districts, stakeholders could consider allocating more NCVPS enrollment slots to rural school districts so that more students from rural areas could take courses unavailable in their local schools. Policymakers could also help ensure “digital equity”, making sure all public schools in rural counties have stable Internet access.

Local School Districts could help hold students accountable for online courses they enrolled in. Local schools could assign onsite supervisor monitoring students taking online courses. This does not need to be limited only to World Languages courses in NCVPS. Local schools could devote course periods specifically for students to work online (although this will require online course content to be asynchronous so that students can access online materials any time). The onsite teacher or supervisor would make sure students are completing their assignments independently. Creating these school course periods specifically devoted to online courses might also help change students’ perception of online courses as less important or not “a real class” because students would still be doing their online courses in classroom settings. Moreover, local schools could also consider selecting and giving enrollment priority to students who are likely to be successful in online settings when applicable.

NCVPS course developers could create software that solve some of the teacher-identified problems. Course developers could create software that blocks the use of online translators when students are completing their World Languages course assignments. They could also incorporate live classroom feature for real-time teacher feedback. In addition, NCVPS could encourage or require World Languages teachers to provide students with optional and

supplementary materials such as news, films and advertisements in foreign languages that could expose students to authentic use of foreign languages.

Limitations and Future Research

This study examined the course offerings of virtual public schools nationwide but only studied NCVPS at length. Many findings that are specific to NCVPS therefore cannot be generalized to other state virtual schools. Case studies on other state virtual schools and their World Languages program should be conducted in the future. Moreover, since virtual charter schools are expanding and playing an increasingly prominent role, World Languages programs provided online charter schools should also be studied and compared with programs of state virtual schools.

The enrollment data provided by NCVPS does not contain year-by-year enrollment information on Russian, which had about 250 enrollments in academic year 2015-16. This missing data might have skewed some of the enrollment percentage calculated.

Another limitation of the study concerns the fact that the geographical categorization of North Carolina counties does not correspond perfectly to the zoning of school districts. The enrollment projection and actual enrollment data are recorded based on school districts, and the study categorizes school districts based on the county-level definition. This inconsistency might have slightly affected the analysis on urban and rural enrollment differences.

The study did not include a survey of students who have taken world languages courses through NCVPS and only provides the teachers' perspective regarding teaching a language course online. Future research could survey students about the reasons they opted for online

languages courses and their perception of taking courses in a virtual setting. By surveying students, research could also investigate whether the internet access or internet speed in district schools and at student homes influence online learning experiences and the decision of whether to take a course online. To examine the effectiveness of virtual languages course, researchers could also study assessment results of online languages courses such as the passing rate, quiz scores and oral practice ratings and compare them with assessment results in face-to-face classroom.

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Appendix A

World Languages Course Offerings in Virtual Public Schools Nationwide

School Name	Operation Type	Number of World Languages Courses (by level)	Number of World Languages (by languages)	High School Graduation requirement on world languages	Number of Schools Served (YR 2015-2016)
Florida Virtual School	Full-time and supplemental	12	4	No Language requirement	3227
North Carolina Virtual Public School	Supplemental; State-operated	25	8	World Languages as an option to fulfill fine art/professional course requirement	945
West Virginia Virtual School	Supplementary, with a Spanish blended program	22	7	World Languages as an option to fulfill fine art/professional course requirement	720
Georgia Virtual School	Supplementary, state-operated	21	6	World Languages as an option to fulfill fine art/professional course requirement	549
Michigan Virtual School	receives state funding, but run by a 501(c)3 nonprofit organization	20	7	One Year of World Languages Study Required	514
Virtual SC (South Carolina)	Supplementary, state-operated	13	4	World Languages as an option to fulfill fine art/professional course requirement	417

ACCESS Virtual Learning (Alabama)	Supplementary, state-operated	15	5	World Languages as an option to fulfill fine art/professional course requirement	405
Virtual Virginia	Full-time (200 students per year) and supplementary	19	5	World Languages as an option to fulfill fine art/professional course requirement	331
North Dakota Center for Distance Education	Both full time and supplementary; state-operated	12	5	World Languages as an option to fulfill fine art/professional course requirement	327
Idaho Digital Learning Academy	Supplementary, separate governmental entity created by legislation with a Board of Directors responsible for oversight.	7	3	World Languages as an option to fulfill fine art/professional course requirement	304
Virtual Arkansas	Supplementary, state-operated	9	3	World Languages as an option to fulfill fine art/professional course requirement	258
Illinois Virtual School	Supplementary, state-operated	14	4	World Languages as an option to fulfill fine art/professional course requirement	251
Montana Digital Academy	Supplementary, state-operated and taught by	13	6 (offers Irish)	No Language requirement	195

	public school teachers; administered by the state university system				
Iowa Learning Online	Supplementary, state-operated	17	5	No Language requirement	190
Mississippi Virtual Public School	Supplementary, run by a private provider	14	4	No Language requirement	127
IDEAL–New Mexico	Both supplementary and full-time online; joint program of the New Mexico Public Education and Higher Education Departments.	5	2	World Languages as an option to fulfill fine art/professional course requirement	121
Vermont Virtual Learning Cooperative	Supplementary, consortium model; all teachers are public school teachers	6	3	World Languages as an option to fulfill fine art/professional course requirement	61
Colorado Digital Learning Solutions	Supplementary, state-operated	10	5	No Language requirement	38
Texas Virtual School Network	Both full-time and supplementary; state-operated	17	6	World Languages as an option to fulfill fine art/professional	N/A

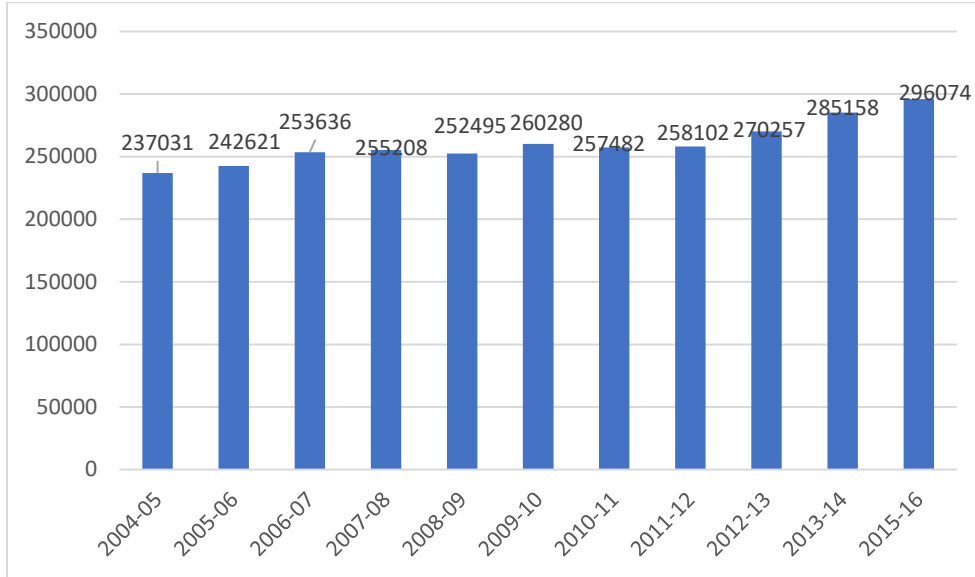
	includes online charter schools in the network				course requirement	
Louisiana Course Choice	Supplementary, state-operated	15	5		No Language requirement	N/A
Maryland Virtual Professional Learning Opportunities	Supplementary, state-operated	21	7		World Languages as an option to fulfill fine art/professional course requirement	N/A
Hawaii Virtual Learning Network	N/A	N/A	N/A		World Languages as an option to fulfill fine art/professional course requirement	N/A
Missouri Virtual Instructional Program	Supplementary, free tuition limited to medically frail students; now in the process of opening up to all public school students	N/A	6		No Language requirement	N/A
South Dakota Virtual School	Both full-time and supplementary; State-operated	14	6		World Languages as an option to fulfill fine art/professional course requirement	N/A
Utah Electronic High School	Closed in 2017	N/A	N/A		No Language requirement	N/A

*The number of World Languages courses are counted by levels (For example, French I and French II count as two courses).

Appendix B

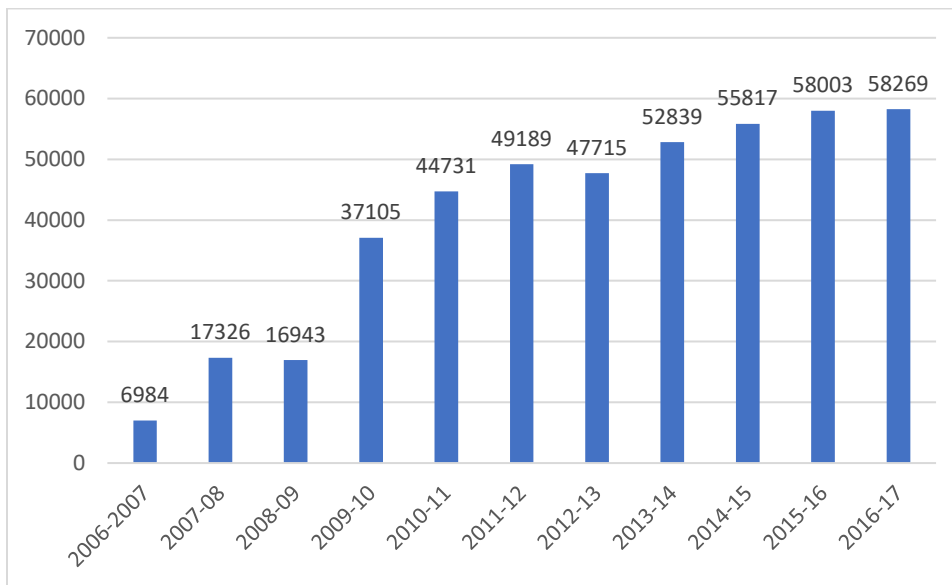
Enrollment Data of North Carolina and NCVPS World Languages

Total North Carolina World Languages Enrollment (2004-2016)



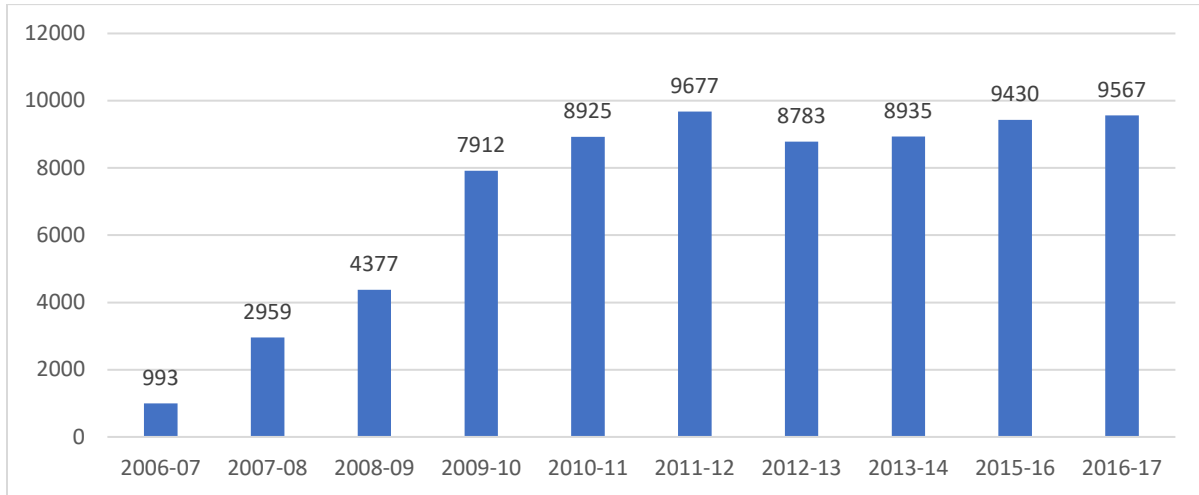
Data source: North Carolina Public School Statistical Profile, Course Membership

NCVPS Total Enrollment (2006-2017)



Data Source: NCVPS Annual Report 2016-17

NCVPS World Languages Enrollment (2006-2017)



*Note: Enrollment data on Russian is not provided by NCVPS.

Data source: NCVPS

Appendix C

Geographical Classification of North Carolina Counties

The North Carolina Rural Center Classification of Counties (adopted in 2015):

Rural: 80 counties with population densities of 250 people per square mile or less, according to 2014 U.S. Census population estimates.

Regional cities or suburban counties: 14 counties with population densities between 250 and 750 people per square mile.

Urban: Six counties with population densities between 750 and 1,933 people per square mile. These counties account for 3.3 million people

Source: North Carolina Rural Center (2015), 2015 Impacts Report

Adjustments made for the study: The Local Education Agencies (LEA) designated by the Department of Public Instruction include both county districts and city districts. This study categorizes the city districts according to their location in counties. For example, Asheville is a LEA located in Buncombe county, which is suburban; Asheville is also counted as suburban although the city's population density is larger than 750 people per square mile.

Appendix D

NCVPS Teacher survey

Demographic Information:

1. Gender: Male/Female/Other
2. Ethnicity: White/Hispanic or Latino/Black or African American/ Native American or American Indian/ Native American or American Indian/Other
3. Age: 18-24 years old/25-34 years old/35-44 years old/45-54 years old/Above 55 years old

Multiple-Choices Questions

4. How long have you been working as a world languages teacher at NCVPS?
A. Less than 1 year B. 1-2 years C. 2-5 years D. More than 5 years
5. How many years of teaching experience in world languages do you have prior to teaching at NCVPS?
A. None B. less than 2 years C. 2-5 years D. 6-10 years E. More than 10 years
6. Which of the following world languages do you teach at NCVPS?
Spanish French German Chinese Japanese Russian Arabic
7. What's your level of proficiency in the language you teach?
A. Native/Bilingual native speaker
B. Advanced proficiency
C. High Intermediate proficiency
D. Middle or lower Intermediate proficiency
8. On average, how frequent do you interact with individual student, both directly (live classroom, video talk) and indirectly (email, give comments or feedbacks)?
A. More than once a week B. Once a week C. Once every two weeks
D. Once a month or less frequent
9. Which of the following are the main reason(s) you choose to work at NCVPS (check all that apply)?
A. Ability to work part-time B. Preference for working online C. Ability to work with larger student population D. Other (please specify) _____
10. NCVPS has developed course materials and syllabus for teachers, do you find these helpful?

- A. Very helpful, I follow the provided syllabus and materials to teach my students
- B. Helpful, I make some adjustments from time to time
- C. Somewhat helpful, I think some of the materials can be improved
- D. Not helpful, I think we should have something new

11. Do you think most of your students meet the course requirement or made great progress in the foreign language at the end of the semester?

- A. Most of my students do.
- B. Some of my students do
- C. A few or no students do
- D. I am not sure

Open-ended question

12. What are some of the challenges you have met teaching a foreign language online?

13. If you have taught in a traditional classroom, what do you think are the main differences between teaching online and teaching in classrooms? Which one do you prefer, and why?