


Fall 12-12-2014

# Empowering Female English Language Learners to Pursue Computer Science Fields: A Practical 4-Hour Workshop for Beginning Teachers in High School

Osaro Althouse  
althouse.osaro@gmail.com

Follow this and additional works at: <https://repository.usfca.edu/capstone>

 Part of the [Bilingual, Multilingual, and Multicultural Education Commons](#), [Curriculum and Instruction Commons](#), [Curriculum and Social Inquiry Commons](#), [Educational Methods Commons](#), [Higher Education Commons](#), [Instructional Media Design Commons](#), [Online and Distance Education Commons](#), and the [Secondary Education and Teaching Commons](#)

---

## Recommended Citation

Althouse, Osaro, "Empowering Female English Language Learners to Pursue Computer Science Fields: A Practical 4-Hour Workshop for Beginning Teachers in High School" (2014). *Master's Projects and Capstones*. 116.  
<https://repository.usfca.edu/capstone/116>

This Project/Capstone is brought to you for free and open access by the Theses, Dissertations, Capstones and Projects at USF Scholarship: a digital repository @ Gleeson Library | Geschke Center. It has been accepted for inclusion in Master's Projects and Capstones by an authorized administrator of USF Scholarship: a digital repository @ Gleeson Library | Geschke Center. For more information, please contact [repository@usfca.edu](mailto:repository@usfca.edu).

Running head: EMPOWERING FEMALE ENGLISH LANGUAGE LEARNERS

University of San Francisco

**Empowering Female English Language Learners to Pursue Computer Science  
Fields: A Practical 4-Hour Workshop for Beginning Teachers in High School**

A Field Project Presented to  
The Faculty of the School of Education  
International and Multicultural Education Department

In Partial Fulfillment  
Of the Requirements for the Degree  
Master of Arts in Teaching English to Speakers of Other Languages

by  
Osaro Althouse  
December 2014

EMPOWERING FEMALE ENGLISH LANGUAGE LEARNERS

**Empowering Female English Language Learners to Pursue Computer Science  
Fields: A Practical 4-Hour Workshop for Beginning Teachers in High School**

In Partial Fulfillment of the Requirements for the Degree

MASTER OF ARTS

in

TEACHING ENGLISH TO SPEAKERS OF OTHER LANGUAGES

by

Osaro Althouse  
December 2014

UNIVERSITY OF SAN FRANCISCO

Under the guidance and approval of the committee, and approval by all the members, this field project has been accepted in partial fulfillment of the requirements for the degree.

Approved:

\_\_\_\_\_  
Instructor/Chairperson

\_\_\_\_\_  
Date

\*\_\_\_\_\_  
Committee Member

\_\_\_\_\_  
Date

\*Added only if there is a second reader

# EMPOWERING FEMALE ENGLISH LANGUAGE LEARNERS

## TABLE OF CONTENTS

	Page
Signature Page .....	ii
Acknowledgment .....	iv
Abstract .....	v
Chapter I – Introduction.....	1
Statement of the Problem.....	1
Purpose of the Project .....	3
Theoretical Framework.....	4
Significance of the Project.....	4
Definition of Terms.....	5
Chapter II – Review of the Literature.....	6
Introduction.....	6
Female Attitudes towards STEM Fields.....	7
Female Attitudes towards Computers and Computer Science.....	12
Science Content Instruction for ELLs.....	20
Educational Blogging Executions.....	22
Summary.....	25
Chapter III – The Project and Its Development.....	26
Description of the Project .....	26
Development of the Project .....	27
Workshop Outline.....	31
Chapter IV – Conclusion and Recommendations.....	32
Conclusions.....	32
Recommendations.....	34
References.....	43
Appendixes .....	49

# EMPOWERING FEMALE ENGLISH LANGUAGE LEARNERS

## ACKNOWLEDGEMENT

I would like to thank God, for without him this would not have been possible. I also want to thank my family, my advisor, and all inspiring professors that have made this journey delightful.

## EMPOWERING FEMALE ENGLISH LANGUAGE LEARNERS

### ABSTRACT

Female English language learners (FELLs) are not taken under consideration when trying to attract new student populations to computer science fields. Frequently, females are studied cohesively without regard to their individual distinctions and challenges. This unique population has to overcome traditional gender perceptions and linguistic confronts when considering the field of computer science. This paper provides a practical four-hour workshop for novice teachers in high school that are eager to empower female English language learners (FELLs) that demonstrate potential or are interested in entering computer science fields. An overview of research within the last ten years is exhibited, which includes the current state of females in science, technology, engineering, and math (STEM) fields, female attitudes toward computers and computer science, science content instruction strategies for English language learners (ELLs), and blogging as an educational tool. The provided practical workshop curriculum considers the linguistic, cultural, and computational needs of FELLs as well as the role of the family in assisting FELLs in pursuing computer science fields. The outlined four-hour workshop catered toward novice teachers in high school includes blogging strategies that involve basic html coding exercises, pair, group, and whole member activities, and Internet research exercises. Upon completion of the workshop, novice teachers will be ready to encourage FELLs to enter computer science fields.

## CHAPTER 1 INTRODUCTION

### **Statement of the Problem**

The fraction of learners within the United States that receive bachelor's degrees in STEM subjects has stayed reasonably persistent (United States Government Accountability Office, 2005). A variety of economic evaluations highlight that the United States is in need of qualified science, technology, engineering, and math (STEM) specialists. In order to preserve excellence in STEM fields, it is recommended that the United States expand the amount of learners that obtain STEM undergraduate degrees by thirty-four percent yearly over existing proportions. In addition, it is claimed that fewer than forty percent of learners that anticipate majoring in a STEM field, finish college with a STEM degree (President's Council of Advisors on Science and Technology, 2012). Therefore, it is crucial learners receive proper STEM preparation in high school and that STEM fields are properly introduced to diverse student populations. In the NSTA report (2013) it is said, "For students learning English, subjects like science, technology, engineering, and mathematics (STEM) may not seem like a priority" (p.20). It is integral that an ampler student population is made aware of the vast opportunities in STEM fields.

English language learners (ELLs) are part of the rising student population within the United States (Albers, Hoffman and Lundahl, 2009). Among them are female English language learners that encounter linguistic and gender confronts when considering STEM fields. While there is extensive research on the linguistic challenges of ELLs, little research has focused on gender and the importance of preparing female English language

learners (FELs) for quality and well paid careers upon completion of high school.

Computer professions are anticipated to include 785,700 novel occupations from 2008 to 2018 (Lacey & Wright, 2009). Furthermore, technology is becoming increasingly important in a globally connected world, which also explains the rise in occupation opportunities within the field of computer science (Khoury, 2007). Even though research indicates the need to prepare English language learners (ELs), minorities, and females for careers in science (Grossman & Porche, 2014), FELs are understudied.

English language learners (ELs) are frequently examined with little regard to gender. This highlights the increasing need to not only encourage ELs as a whole, but to particularly support FELs who not only find themselves balancing languages, culture, and gender roles, but who could tentatively shy away from an enriching academic or professional career in the field of computer science. National nonprofits, such as “Girls Who Code” try to diminish the gender gap in the technology business (Dockterman, 2014). However, FELs are a unique population that not only has to conquer the gender challenges, but also the linguistic tests.

The data reveals that educators have to be prepared to meet the educational needs of learners from varied backgrounds. While teachers may be quick in assessing and attempting to manage the linguistic challenges of FELs, it is crucial that students receive opportunities to integrate their cultural backgrounds and knowledge in the classroom. This helps students prepare to meet the content, standards, and procedures of academic disciplines (Lee, 2005).



### **Purpose of the Project**

The data demonstrates an increasing need for skilled and trained educators that are able to meet the needs of a diverse student population in high school (Lee, 2005). While there is a focus on the linguistic and cultural demands of English language learners (ELLs) in high school (Lee, 2005), this project demonstrates a four-hour workshop for novice teachers in high school that are eager to encourage female English language learners' (FELLs). The workshop fosters the linguistic and computer skills of FELLs in order to prepare them for a career in computer science.

In the four-hour workshop, novice educators learn how to effectively use blogs to improve female English language learners' computer skills and discover techniques to integrate and scaffold blogging exercises that will help FELLs become more confident in utilizing computers for academic and professional purposes. The underlying emphasis of the workshop is female English language learners' linguistic, cultural, and family background. The four-hour workshop stands as a foundation for new instructors that are ready to empower, encourage, and guide FELLs that are pursuing computer science fields.

This field project is integral because it acknowledges the unique encounters of FELLs that are encouraged or interested in pursuing computer science fields. Female English language learners consist of a population that has to confront conventional gender representations in science, as well as linguistic demands. It is; therefore, crucial that novice teachers are prepared to support and encourage this distinctive population by providing them with effective foundational skills that will help FELLs succeed in computer science fields.

### **Theoretical Framework**

Female English language learners (FELLs) can't be understood and supported in the mere context of the classroom. They have to be comprehended and encouraged at home and in school. Teachers have to understand the role of the family in FELLs lives in order to help them pursue a career in computer science. Family is a crucial component that has to be considered in preparing culturally and linguistically diverse FELLs.

Family systems theory explains the emotional interdependence between members of a family. This theory will be utilized to address the importance of a support system for FELLs beyond the classroom. The theory implies that individuals cannot be perceived in isolation, but rather as a part of the family, a unit. The individuals within a family are interdependent and interconnected (The Bowen Center, 2014). Therefore, in order to understand and support the individual, who in this project is the female English language learner, it is critical to perceive the cultural, linguistic, and gender expectations that are reflected in the student's family environment.

### **Significance of the Project**

Novice teachers in high school have to be prepared to serve students from various backgrounds. Research has focused on helping teachers understand and prepare English language learners (ELLs) for science (Lee, 2005); however, female English language learners' (FELLs) unique challenges haven't been addressed. In the four-hour workshop, new teachers are able to discover skills that benefit them in preparing FELLs for computer science, a field with increasing job prospects (Khoury, 2007). New teachers need catered support and opportunities to learn among other novice educators. The learned skills can be graciously applied with FELLs in high school. It also encourages

teachers to create positive relationships with learners and their families. A skilled and readily equipped new teacher can utilize his or her ambition to connect with FELLs and their families to help FELLs stay motivated and determined toward their goal of entering computer science fields.

### **Definition of Terms**

**Blogger** – Refers to a blog tool, a publishing platform, and a content management system (blogger.com).

**Blogging** – OR “web logging” a publishing method (Williams & Jacobs, 2004).

**Blogs** – “web logs” a way of improving and encouraging valuable interactions among students (Howland, Jonassen, & Marra, 2012, p. 170).

**Bowen Theory** – Points out that members of a family are emotionally connected, which makes family members interdependent (thebowencenter.org).

**ELL(s)** – English Language Learner(s)

**FELL(s)** – Female English Language Learner(s)

**HTML** – Hypertext Markup Language is a consistent system for marking text files to attain color, graphic, font, and hyperlink results on World Wide Web sheets.

**STEM** – Science, Technology, Engineering, and Math

## CHAPTER II

## REVIEW OF THE LITERATURE

**Introduction**

Research has not specifically looked at the unique needs of the female population of English language learners in science education. A variety of students in the United States are from varied backgrounds. Minorities make up a large population in the United States. Instructing science from an all-inclusive viewpoint is becoming more and more important (Petty & Narayan, 2012). The purpose of this paper is to review the literature on elements that would engage and encourage female English language learners (FEELs) in high school to enter computer science fields. This is important because research by Lee (2005) has examined English language learners' linguistic abilities and subject area education; however, gender has not been addressed with regard to English language learners and science.

It is integral that all students are given a chance to enter science fields. The United States is in need of qualified people in science and technology. The National Academy of Science and the National Academy of Engineering voiced their concern about the United States' economic and social conditions in respect to science and technology. They expressed trepidation about the ability of U.S citizens to compete for quality employment with an abating in science and technology (Augustine, 2008). This review of literature investigates the current prospects for female English language learners (FELLs) in pursuing computer science fields upon graduation from high school. The analysis will outline female attitudes toward STEM fields, female attitudes toward computers and computer science, science content instruction strategies for English language learners, and educational blogging executions.

## Review of the Literature

**Female Attitudes toward STEM Fields**

“Children of immigrants are more likely to have parents with relatively little formal education” (Capps, Murray, Ost, Passel, Herwanto & Urban Inst, 2005. p.25). It is vital that teachers are equipped with the necessary strategies and tools to help female English language learners (FELs) stay interested and succeed in science, technology, engineering, and math (STEM) fields. Liu, Lou and Shih (2014) conducted a study on STEM self-efficacy and career commitment in engineering with females in high school. Social cognitive career theory and social cognitive theory were both utilized as a theoretical framework to investigate the impact high school learners’ philosophies about female gender roles and women engineer role models have on the perceptions of STEM self-efficacy and career commitment in engineering.

The subjects were eighty-eight learners from a public girls’ high school that took part in project-based learning in STEM. The researchers used a questionnaire to gather statistics. The results emphasized that female high school learners’ ideas about gender roles, STEM, as well as female engineer role models had an impact on professional career commitment in engineering. The most tremendous impact on STEM self-efficacy among female high school learners stemmed from female engineer role models. It was stated that female learners were able to gain inspiration from effective illustrations of female engineer role models (Liu, Lou & Shih 2014).

This study revealed the importance of female role models for female high school students’ self-efficacy in STEM; however, it does not account for the needs of female English language learners (FELs). A female role model might not be enough for a female English language learner to experience heightened self-efficacy. In addition,

gender might not be the only factor that could enable a female English language learner to relate to the role model. Race or the linguistic background could be an essential element in enhancing FELLs motivation.

Males have conventionally governed the fields of science and engineering (Liu, Lou & Shih, 2014). It has become increasingly important to get women interested and stay interested in STEM fields. Christensen, Knezek and Tyler-Wood (2014) conducted a study with three hundred sixty-four high school students that took part in a residential science and mathematics program that was conducted on the campus of a university. Participants were learners that were finishing their final two years of high school while simultaneously attending their first two years in college.

The research focused on outlooks concerning STEM subjects and professions. The researchers used a cross-sectional questionnaire. The viewpoints were examined and compared to statistics that were collected with the identical mechanism from additional learners and educators. The outcomes exhibited that the residential learners had STEM attitudes that were parallel to that of STEM professionals and not equivalent to conventional high school learners. The study also found that women who were part of the residential science and mathematics program had more optimistic views of STEM as a profession compared to males (Christensen, Knezek, & Tyler-Wood, 2014).

The study by Christensen, Knezek, and Tyler-Wood (2014) highlights the importance of introducing women as early as possible to STEM careers. While the literature addresses race, gender, and dispositions, FELLs are not specifically addressed. It is important to find out what fosters positive dispositions among FELLs and what could be done in high school to maintain female English language learners' optimistic views toward STEM.

Females and males remain in distinct professions whereby continuing a division within the labor market (Sinclair & Carlsson, 2013). Sinclair and Carlsson (2013) investigated the influence of gender identity threat on adolescents' professional inclinations. The subjects included two hundred and ninety-seven adolescents from Swedish schools, where forty-five percent were female. The researchers utilized an approach that refers to a person's individual implications about their potentials. Findings demonstrated that female adolescents desired more stereotypical female professions when they experienced a threat to their gender identity. The same was true for male adolescents. However, males were shown to exhibit more elaborate stereotypical predilections compared to females.

When examining female English language learners (FELLS), it is essential to perceive gender roles in their cultures and how these might affect female English language learners' choice in entering or avoiding STEM careers. In order to prepare FELLS for STEM careers, it is integral to consider academic, cultural and gender identity aspects within the classroom.

Female English language learners (FELLS) should receive elaborate exposure and encouragement in STEM education in order to academically and mentally prepare themselves for the field. Griffith (2010) conducted a study on freshman students that were enrolled at diverse four-year universities and colleges in the United States. They determined the elements that aid in keeping all learners committed to STEM field majors. Emphasis was put on minorities and females. The study utilized constrained statistics that were retrieved from the National Longitudinal Survey of Freshman and the National Education Longitudinal Study of 1988. The research found that a multiplicity of learners

who initially exhibited interest in STEM fields at the time of their post-secondary academic career, eventually turned away and did not earn a degree in STEM.

The research also pointed out that women and minorities rarely selected a STEM major and when they did intend to major in these fields, changed their minds and modified their anticipated major. The illustrative figures exhibit that a slighter amount of minorities and females stayed committed to STEM field majors in comparison to non-minority learners and men. However, regression evaluation among other things highlighted that an increased percentage of minority and women graduate learners in STEM had an encouraging influence on women and minority learners' commitment to STEM majors (Griffith, 2010).

It is important to determine the essential tools that female English language learners (FELLs) need to succeed and persevere in STEM fields. The research addressed minorities and females, but did not refer to the linguistic abilities of minorities and females that were examined. While research has shown that females benefit from women role models (Liu, Lou & Shih 2014), it is important to consider the background of role models and how FELLs best relate to role models. Prior academic preparation, exposure to relevant female role models, and the proper selection of an institution after high school graduation should be an integral part of the decision making process for FELLs who are interested in pursuing STEM careers.

Female English language learners (FELLs) have to have opportunities to enter STEM fields. FELLs need additional support and reassurance before entering STEM fields. The linguistic barriers they may encounter could result in further hesitation. The academic and career rewards, as well as the higher earnings in STEM related fields could be of



interest to FELLs. It might encourage FELLs, as well as diminish the inequality in incomes between males and females in the workforce.

Oh and Lewis (2011) led a study on race and gender inequity in the United States' economy in STEM fields. The reasoning was that these fields conventionally started with higher earnings and traditionally employed white males. The study examined whether changes in the STEM field population have resulted in an increase in compensation equivalence. Five percent of the Public Use Microdata Sample of the 2000 Census and American Community Surveys from 2001 to 2006 were utilized. Subjects included college alumni who were employed for forty hours for forty –eight weeks within a given year. They found that minorities and females continue to be increasingly outnumbered in STEM fields. Among other things, the results exhibited that minority and women college alumni received comparative pay compared to white males in STEM. It was mentioned that “women and minorities considering STEM careers should not encounter greater pay disparities than college graduates in other fields” (Oh & Lewis, 2011, p. 402).

The literature underlines the possibilities for females and minorities to receive higher pay in STEM careers compared to other careers; however, when applying these findings to female English language learners (FELLs), confidence, reassurance, and proper academic preparation should play a crucial role in encouraging these populations to enter STEM fields. This is not addressed in the literature. Female English language learners (FELLs) who are interested in entering STEM fields have to know about the possibilities in STEM fields, as well as become knowledgeable about the academic and emotional demands in order to stay persistent and interested in achieving their goal.

Female English language learners (FELLs) are likely to encounter more than one barrier after deciding to pursue a career in STEM. Because FELLs come from diverse

backgrounds, most of them are female and minority simultaneously. These two factors can demotivate students who are aware of the low representations of these two populations in STEM professions. Grossman and Porche (2014) completed a study on inner-city adolescents' opinions of ethnic, racial, and gender obstacles in STEM achievement and their managing and understanding of the particular happenings.

Participants included one thousand twenty-four high school aged learners that completed questionnaires and fifty-three learners that were interrogated. The research exhibited that affirmative communication from family, counselors, and educators about STEM could reduce biased ethnic/racial and gender perceptions. The received reassurance could eliminate the stereotypical judgments that minority learners might otherwise adopt. In addition, the study also insinuated the impact family gender roles have on adolescents' inclination and self-assurance in pursuing STEM fields.

Female English language learners (FELLs) have unique needs that have to be considered by teachers who work with ELLs. The role of society, administrators, teachers, counselors, and educators are crucial in helping FELLs take the leap to pursue STEM fields. A supportive and encouraging environment is essential in helping FELLs stay confident about their aptitude and choice to pursue a career in STEM.

### **Female Attitudes towards Computers and Computer Science**

Technology and computers are becoming exceedingly relevant for students. Huffman, Whetten, and Huffman (2013) investigated the correlation between technology, self-efficacy, and gender roles. The research included seven hundred and fifty undergraduate learners from a public university in the United States. Students completed a questionnaire. The findings demonstrated that males echoed better ratings of technology self-efficacy compared to females. In addition, gender roles, precisely masculinity, were

more prognostic of better ratings than the label of biological sex. Therefore, it is crucial that female English language learners (FELLS) receive the necessary support and preparation to confidently enter computer science fields.

Technology is becoming increasingly important in academic and professional settings. Hon Keung and Alison Lai Fong (2012) conducted research to define learner distinctions of confidence between men and women in utilizing technology for studying. The study was completed in higher education institutions in Hong Kong. A questionnaire was used with a convenience sample to determine whether male learners had higher confidence in utilizing technology for education compared to female learners. They found that male learners possessed higher confidence in utilizing technology for studying compared to their female counterparts. Furthermore, the research exhibited that females and males were interested in learning how to utilize technology. Research demonstrates that females are willing to learn. However, they need appropriate support and encouragement to further explore technology related fields, such as computer science.

Computers are part of everyday life. However, it is integral to differentiate the varied uses of computers. While computers are frequently utilized for pleasure, the academic and professional benefits of computers should not be overlooked. Fedorowicz, Vilvovsky and Golibersuch (2010) conducted research to recognize gender and age group distinctions in voluntary technology utilization. Researchers utilized a partial paper and web-based questionnaire of teenage computer actions. The adolescents were middle and upper-middle class learners. Research exhibited that females were more apt to utilize technology for interaction while males used computers for entertainment. Once females attended high school, they utilized computers more for homework compared to their male counterparts. Most importantly, in middle school both males and females reported equal

technical abilities. However, by the time both males and females attended high school; males reported an increased level of skills compared to females. Males demonstrated more knowledge of computer programs in high school. The research clearly displays that females need encouragement in high school in order to confidently enter computer science fields.

Female English language learners (FELLs) have to get adequate experience in utilizing computers to increase their level of confidence. Broos (2005) directed a study on gender gaps in information and communication technologies. The amassed data came from a project in Belgium called “Marginality in the Information Age: Reasons for Non- and Low Adoption of Digital Applications,” as mentioned in the research. Computer supported telephone interviews were piloted with Flemish grown-ups of which forty-six percent were male and fifty-four percent were female. They found that men were more prone to have optimistic attitudes concerning computers and the Internet, whereas women exhibited more computer angst. Furthermore, men demonstrated more experience and felt ahead of others compared to women. In addition, when uncovering a new channel, men were more enthusiastic compared to women. Only males demonstrated that an increased self-perceived computer understanding had an encouraging outcome on outlooks toward novel communication technology. It is; therefore, integral that FELLs receive varied streams of encouragement to pursue computer science fields.

The research by Hohlfeld, Ritzhaupt and Barron (2013) investigated gender distinctions connected to information and communication technology literacy with learners that were in eight grade at a Florida public school. Students completed a survey that measured their perceived ICT abilities; their feelings toward computers, and their regularity of computer use. Learners also took part in the online performance assessment called “Student Tool for Technology Literacy”. Research found that females achieved

higher than males in all ICT literacy parts. With respect to gender, females had better insights of their ICT abilities. These findings exhibit distinct results compared to Broos (2005). It has to be highlighted that this study was conducted with learners in eighth grade. As a result, it is significant that female English language learners (FELs) receive support and encouragement as early as possible in order to give them an opportunity to confidently enter computer science fields.

Female English language learners (FELs) need to be able to practice working with computers. Jun and Freeman (2010) examined the means in which gender impacts the improvement of common computer self-efficacy among learners in college. Two hundred and eighty-one undergraduate business learners of a public university completed questionnaires. Research found that women felt less assured and anxious with computers due to lack of knowledge and practice compared to men. It is increasingly important that FELs are given opportunities to practice and familiarize themselves with computers.

Female English language learners need more self-assurance in order to confidently utilize computers. Birol, Bekirogullari, Etc, and Dagli (2009) examined the connection between gender and motivation, computer angst, self-confidence, and the utilization of computers in an occupation or career. Hundred fifty-seven first-year students, which included seventy-seven females and eighty males at Near East University finished the computer attitude scale. They found that females demonstrated extremely subordinate scores than males in computer self-confidence. Furthermore, males exhibited higher mean scores in motivation, use of computers, and computer anxiety. Therefore, it is suggested that FELs get tremendous encouragement and practice with computers in the classroom.

Computer science is offered in undergraduate and graduate departments across colleges and universities in the United States. According to the Computer Science

Teacher Association (CSTA), computer science experts and teachers are disturbed by the low prospects K-12 learners have in committing to computer science at the post-secondary level (Khoury, 2007). The CSTA collected reports to become knowledgeable about the status of certification obligations for K-12 educators of computer science and paralleled it throughout states in order to better train K-12 educators, as well as emphasize the significance of computer science within the employment market. Information was retrieved through surveys that were sent out to all states via email with follow up phone calls for unresponsive states.

The Computer Science Teacher Association (CSTA) found that only a small number of states had established specific certification necessities for computer science as an independent academic field. In addition, various states did not possess a knowledgeable perception of the field of computer science. Computer science was not regarded as an independent discipline in K-12, but rather a part of other taught subjects. Furthermore, educators who taught computer science lacked proper preparation to successfully teach in K-12 institutions. Lastly, while most of the states regarded computer science as an imperative discipline in secondary school, they did not possess state standards for computer science teachers (Khoury, 2007).

Educators have to be able to successfully prepare diverse student populations for careers in computer science. A lack of knowledge about computer science, as well as unawareness about the needs of female English language learners (FELLs) that are interested in computer science could act as a hindrance to attracting a more diverse population into computer science fields. Utilizing deliberate strategies to prepare and engage FELLs is essential in keeping FELLs interested in computer science. While the

CSTA addressed the need to further increase understanding and prepare states and educators to teach computer science, it did not account for the unique needs of FELLs.

It is also significant to understand the experience of females in computer science courses at the undergraduate college level in order to better serve the female population in high school that is preparing to enter computer science majors upon high school graduation. Stoilescu and Egodawatte (2010) conducted a study on male and female learners in undergraduate computer science programs to find out about male and female self-perceptions on computer science exercises, their attitudes toward computer science professions, and their predilections and aversions about computer science performances. The constructed research questions focused on computer usage, social exchanges, and programming in computer science.

The inquiry was completed at an average –sized university in Ontario with approximately sixteen thousand learners. The qualitative research used representational investigations to observe interviews, surveys, documents, classrooms and laboratories. Stoilescu and Egodawatte (2010) found that computer usage was the same among males and females. However, male learners had a higher level of self-assurance and less angst in utilizing programming and computers compared to their female counterparts. In addition, women were more curious about databases, web-design, and web programming, whereas men were interested in hardware, networks, and more. Generally, men were more captivated by programming than women and also outpaced females on programming. Furthermore, women were not as active about investigating employment opportunities in IT and were less self-directed. Both males and females pointed out that appreciating computers, hard work, and being detailed all aided in becoming an effective learner and expert in computer science.

The research exhibits that females are still experiencing hesitation when it comes to more complex usages of computers, as well as lack the confidence that their male counterparts possess. It is also important to highlight that females seemed less self-directed and; therefore, could use elaborate help from educators to demonstrate career opportunities in computer science fields. While this study carefully examined male and female perceptions of computer science, the research did not regard variations in backgrounds of female populations. Other variables might heighten the level of anxiety among FELLs that pursue computer science at the college level. In order to attract FELLs to computer science fields, it is integral to recognize their needs and to start working with computers in high school. Educators who know what will be expected of male and female students upon high school graduation can successfully prepare FELLs to enter computer science with confidence and a secure set of skills.

Stoilescu and McDougall (2011) examined difficulties that men and women experienced in a computer science program by inspecting seven courses on three digital divide divisions from Kelly's (2008) model; culture specific understanding, education, and resources at a standard sized university in Ontario. Information was collected through document inquiry, observations, and interviews. They found that males and females both had equal access to computer resources. However, women in the computer science program possessed increased fear, low self-confidence, and underachieved. In addition, the research highlights that males had more experience in programming outside of academia compared to females, which could have lowered their levels of anxiety. Recognizing these differences in experience between males and females can help educators take steps in high school to provide enough exposure and encouragement to FELLs.



Computer education is vital in today's interconnected world. It is even more important for learners who intend to study computer science post high school graduation. Educators have to be willing to prepare female English language learners (FELs) for careers in computer science. Banerjee and Santa Maria (2012) directed a study on views of two hundred twenty learners in an optional introductory computer science course at Buffalo State College. Information was gathered through a thirty-six-item questionnaire. They found that a large number of women were disinterested in pursuing computer technology education. Furthermore, females in the course registered to complete general education requirements, whereas men registered because they were interested in computers. Females did not associate computer or technology disciplines with men, antisocial behavior, or geeks; neither did they believe that males are better equipped for technology professions. Among other things, men were more informed about job opportunities in computer associated arenas compared to women. This in particular, emphasizes the need to educate and encourage FELs to prepare and research the field of computer science to better understand future job prospects.

Educators have to be determined to serve a diverse student population. Attracting FELs to computer science fields requires a high level of confidence among teachers, as well as students. Komarraju and Nadler (2013) explored resource managing, cognitive-metacognitive approaches, and motivational focuses in projecting educational accomplishment. Four hundred and seven undergraduate learners finished a survey, a scale, an inventory, and reported their grade point average. They found that learners who were sure about their educational performance and who had high confidence and self-efficacy were more apt to suppose that aptitude could be modified and affected by hard

work. The study highlighted that learners who had high self-efficacy were likely to succeed academically and persevered during challenging times.

The research by Komarraju and Nadler (2013) demonstrates the importance of increasing learners' self-efficacy. It is crucial that high school educators motivate and support female English language learners (FELLs) that are determined to enter computer science careers. Their self-perceptions and continued self-reviews can have a tremendous impact on their commitment to completing an academic degree, as well as a career in computer science.

### **Science Content Instruction Strategies for English Language Learners**

It is especially important for English language learners (ELLs) in high school to receive catered encouragement in all subject areas while improving their English skills (McDonnough & Cho 2009). The linguistic abilities of FELLs are integral to successfully prepare these students for computer science.

In Lee (2005) it is stated that a rising student population consists of immigrants who require educators that specifically address the instructive needs of learners who are obtaining linguistic, cultural, and academic necessities simultaneously. In addition, it is claimed that ELLs need to be able to acquire linguistic and literacy skills in conjunction with subject area education. It is important that ELLs get a chance to develop their linguistic, literacy, and content skills in order to open opportunities for this student population to enter science fields. Lee (2005) also highlights that if ELLs learn science in English that it is directly connected to the students' English proficiency.

Manzo, Cruz, Faltis, and de la Torre (2011) performed research on thirty science educators from secondary institutions that participated in a nine-month workshop in order to utilize the 5E model approach. The approach entails engagement, exploration,

explanation, elaboration, and evaluation to enhance science knowledge attainment among ELLs in immigrant districts in California. The research was conducted through observations of six educators. They found that the 5E pedagogical methods improved reasoning, engagement, and knowledge acquiring in science among ELLs. It was also noted that educators who understood academic subject matter, often did not know how to engage and teach ELLs effectively. The research clearly demonstrates that it is crucial that educators are aware of effective strategies to teach academic content to female FELLs.

Edmonds (2009) identified five challenges ELLs face when learning science content and offered strategies that could help educators involve ELLs in science classes. The listed approaches encourage educators to integrate diverse cultural perspectives when teaching science and to support ELLs in understanding science content through scaffolding. It is also highlighted that teachers should pay attention to the differences in conversational and academic English proficiencies among ELLs to better prepare them to achieve in science, as well as provide enough examples when teaching writing. Lastly, educators are asked to provide enough opportunities and incentives for ELLs to participate in class discourse.

Female English language learners (FELLs) need educators that are prepared to utilize diverse pedagogical approaches to meet their linguistic and content area needs. Johnson, Yerrick, and Kearney (2014) suggest pedagogical approaches for science educators that teach students from diverse linguistic backgrounds. It was proposed that educators become familiar with second language acquisition processes, educate themselves about students' home language and culture, and find and implement necessary resources for ELLs, such as dictionaries and science texts in the students' native language.

Furthermore, teachers are encouraged to include science analysis, make studying more personal, and adjust assessments by providing ELLs with evaluations that are contextualized.

### **Educational Blogging Executions**

Blogs have become a visible tool in pedagogical practices in various classrooms. Blackstone, Spiri, and Naganuma, (2007) explored the usage of varied blog activities within distinct levels of an English for Academic purposes / composition program in an English University in Japan. Hundred and forty-five learners in English for academic purposes class completed an attitudinal questionnaire that was completed over two semesters in eleven courses. They found that students, who already liked to write enjoyed blogging and posting class assignments. In addition, regardless whether students appreciated writing or not, they enjoyed reading their peers writings, as well as receiving and responding to classmates' comments. Furthermore, learners liked receiving comments from their instructor in addition to having an assigned classmate that functioned as a blogging buddy editor. While Blackstone, Spiri, and Naganuma (2007) point out the benefits of blogging activities in fostering student-centered learning, gender distinctions in attitudes toward blogging are not included. It is crucial that science educators who decide to implement blogging activities in high school consider the implications of gender, culture, and language, particularly when preparing FELLs for computer science.

Davi, Frydenberg and Gulati (2007) conducted research at a business institute about the utilization of blogs to enhance discussions in classrooms. Comparable blogging exercises and assessments were ascribed to three courses, e-commerce, expository writing, and government-in to facilitate discussions in learners' fields of study. Subjects

completed a fifteen question electronic questionnaire. Findings indicated that blogging could be successful in emboldening classroom discussions. In addition, learners were able to ominously advance their writing, reading and critical-thinking skills. They also improved their general learning abilities. The research exhibits that females encountered an increased advantage from their blogging journey, compared to males. Females experienced more apprehension and struggle than their male counterparts. Females shared that blogging aided them in improving their analytical and critical thinking abilities. Furthermore, females concurred that blogging, enhanced discussions and aided in studying for the class. These findings demonstrate that blogging contributes to the overall learning experience of females. Female English language learners (FELLs) who get the opportunity to utilize blogs within a science course will almost certainly benefit from the experience.

Science teachers have to be able to engage students in multiple ways. However, it is also important that students learn how to take responsibility for their own learning. Foroutan, Noordin, and bin Hamzah (2013) conducted a study in a writing course in Malaysia. They researched ESL students' experience with blogs in a writing class for an entire semester. In addition, they also investigated the results of utilizing blogs on learners' writing independence. The participants included thirty undergraduate English major students from the University Putra Malaysia. Learners completed a survey and participated in interviews at the end of the semester.

The research indicated that blogs were effectively promoting learner autonomy among language learners. In addition, students appreciated writing and receiving writings from their classmates, as well as felt motivated to exchange writings outside of the classroom without the supervision of an instructor. Overall, the results indicate that

students appreciated the whole blogging publishing process, especially because it allowed for extensive peer interactions, free publications, and the sharing of found resources (Foroutan, Noordin, & bin Hamzah 2013; Sun 2010).

The study reveals that subjects included seventeen female students and thirteen male students, but the research did not emphasize any gender differences in the usage or perspectives on blogging. However, in order for science teachers to be able to reach female English language learners (FELs), it is important that these distinctions are highlighted.

Research exhibits that using blogs in effective ways in high school science courses can have positive impacts on students' learning. Luehmann and MacBride (2009) examined two classroom blogs that were utilized by science teachers who distinctively used their classroom blogs to educate students. Six classroom blogging approaches were investigated, replying to instructor stimuli, allocating resources, logging lessons' highpoints, reflections of learned material, engaging in online discussions, and posting learning confronts. Luehmann and MacBride (2009) questions included:

How did the teacher structure and use their classroom blog, and why?

How did the students actually use the classroom blog?

What benefits did the teacher attribute to using the classroom blog?

(p. 6).

The aim of the study was to recognize education prospects that are derived from definite utilizations of classroom blogs. The researchers used a content analysis approach in examining the two chosen classroom blogs, in addition to a detailed interview with both educators. They found that if learners were given opportunities to individualize their learning, publish their work for audience members outside of the classroom, as well as

participate in interactions with their classmates, they were engaged and enjoyed a more students-centered classroom. This indicates that the extent to which a blog can foster a more engaged and fulfilled learning experience is largely dependent on the amount of control that is transferred to the student and how the classroom blog is set up. The study highlights very important aspects concerning the impact a blog can have on students' learning. However, the distinctions between male and female are not considered. Neither are the language abilities of the participating students. The diverse student population in today's schools within the United States needs a science content approach that works for students from varied backgrounds, particularly female English language learners (FELs) who are aiming for a career in computer science.

### **Summary**

The discussed articles give a clear context of the current attitudes of females towards computers and computer science fields, provide explanations for the linguistic complexities English language learners (ELs) experience in U.S. high school science classrooms, and provide practical propositions that have impacted the direction of this field project. The research examined current classroom environments that have contributed to the challenges ELs encounter in science, but also shared approaches to conquer them. The increasing need for qualified people in the computer science industry (Khoury, 2007) gives rise to the importance of attracting diverse students to computer science fields. Female English language learners (FELs) face linguistic and gender identity restrictions when considering a conventionally male dominated field (Liu, Lou & Shih, 2014), such as computer science. This field project utilizes the existing findings to demonstrate a blogging approach to serve beginning teachers in high school in supporting, preparing, and encouraging FELs to enter computer science fields.

## CHAPTER III

## THE PROJECT AND ITS DEVELOPMENT

**Description of the Project**

Female English language learners (FELs) in the United States have to confront linguistic, cultural, and gender implications when considering a career in computer science. Science content instruction in high school is frequently catered towards mainstream language and culture, leaving FELs unaware of the vast opportunities and possibilities in the field of computer science. The linguistic concerns that potentially distract FELs from fields such as computer science can result in restricted career pursuits for this student population. As a result, this project helps FELs to confidently pursue computer science fields.

Studies that have examined female' attitudes towards computers and computer science have noticed an increased anxiety toward computers among females (Broos, 2005; Jun & Freeman, 2010; Stoilescu & Egodawatte, 2010; Stoilescu & McDougall, 2011). In addition, females also lack proper experience with computing or in investigating job prospects in computer science fields (Stoilescu & Egodawatte, 2010; Banerjee & Santa Maria, 2012). In order to confidently pursue computer science fields, FELs have to be aware of job outlooks and the needed abilities to succeed in computer science. The literature review establishes an understanding that helps in constructing a field project that aids novel educators in high school to prepare FELs for computer science fields.

The main objective of this field project is to reduce FELs level of anxiety toward computers. This aim is addressed in a four-hour workshop for novel educators in high school. During the workshop, educators get the opportunity to connect with other novel



high school educators, learn about the prospects in computer science, as well as discover creative ways to integrate blogging as an instructional and foundational tool for computer science. Instructors are encouraged to obtain a reflective approach, as well as a practical methodology in keeping FELLs engaged and motivated.

This field project perceives the importance equal preparation and education for males and females in computer science. Both populations need adequate tools to successfully pursue computer science fields. The drive of this field project is to cultivate driven educators that are interested in supporting and encouraging FELLs that exhibit potential or interest in computer science fields.

The skills and discoveries educators encounter during the workshop can be immediately applied with FELLs. I established this workshop after researching the needs of FELLs. The materials and ideas are original and provide helpful tools to assist educators in the classroom. The four-hour workshop targets novel educators in high school that are zealous to encourage FELLs to enter computer science fields. The overarching question of the project is: “How can family, role models, technological tools, language, and culture support FELLs in entering computer science fields?” Interactive activities, pair, group, and whole member exercises along with technology are utilized to establish a four-hour workshop that inspires novel educators to enthusiastically support and encourage FELLs in entering computer science fields.

### **Development of the Project**

My objective in designing this workshop is to offer guidelines for novel high school teachers that are interested and eager to support and encourage FELLs in pursuing computer science fields. Computer science was initially a field that did not receive a lot

of attention in my high school years. It is my intent to increase awareness among FELLs in particular because this population has to confront gender and linguistic confronts simultaneously. These students could potentially neglect the possibilities in the field of computer science because of the overwhelming linguistic and cultural challenges.

I became interested in the project because I noticed that there is an increasing demand for computer scientists within the labor market in the United States. However, few people possess the skills and the readiness after high school to enter computer science fields. In addition, few educators comprehend the components of computer science and often mistake it as a broad technology field or other unrelated field. Computer science is frequently not addressed as an independent discipline within high school. It needs unique preparation from the perspective of the educator in order to support a growing ELL population in high school. Females are largely underrepresented in computer science fields and often feel isolated and intimidated. If females can become aware and prepared before having to choose a college major, there is an increased chance for them to choose computer science as their major or even career.

I was able to learn about the skills that students learn in computer science and noticed that these go beyond computer literacy and computing. Abilities students learn include creativity, analysis, problem solving, and more. These are skills that are valuable in an array of subjects and professions. The stereotypical perspectives of computer science that still persist in too many peoples' minds have to be modified with objective and accurate information. While I was growing up, these stereotypical images were rampant and distracted from the innovative possibilities this field provides for so many learners that venture to pursue it.

I learned a lot about the challenges of females who enter the field of computer science. Research demonstrates that males are more experienced before entering computer science majors and professions. Females on the other hand come less prepared. This often results in a change of major or in underperformance in computer science courses. If females can become aware of computer science fields, its benefits, and the lack of representation of female English language learners (FELLs) within the field of computer science they may become motivated to enter this rewarding and high paying profession. Studies also indicate that computer science is one of the fields that allow females to earn equal pay to men. If diverse learners can be attracted to the field, the inventions, as well as the developments could target a larger population within the United States.

In an effort to prepare novel educators in high school, blogger.com is rampantly utilized during this workshop to not only engage and prepare FELLs for computer science fields, but to increase educators' comfort level with technology in the classroom. The workshop is created with the overarching concept of family systems theory. Family systems theory emphasizes that members of a family are interdependent (The Bowen Center, 2014).

The workshop starts with a thirty-minute PowerPoint lecture that is aimed at increasing novel educators' awareness of job prospects and the skills students learn when pursuing computer science. Once instructors learn about the field of computer science and ask relevant questions, they are encouraged to actively participate in blogging exercises. During the blogging activities, instructors work independently, in pairs, in small and large groups, and in a whole member setting. Teachers learn basic html coding through blogger.com, develop approaches to find appropriate role models for their female

English language learner (FELL) population, and construct ways to integrate family, language, and culture into FELLs learning. Throughout the workshop, educators are asked to maintain a reflective approach to foster a continues improvement throughout their teaching careers.

Educators are given opportunities to adapt and modify materials throughout the workshop. Instructors' input is encouraged and demanded within specific activities. Every exercise is completed with FELLs in mind. This gives instructors the opportunity to construct materials that can be readily utilized with their FELL population.

Overview of the four-hour workshop for novel teachers in high school:

<b>Purpose</b>	<b>Practice</b>	<b>Materials</b>
Educators get a chance to interact with other workshop members. This helps in establishing harmony among all members of the workshop.	<b>Reducing Unfamiliarity:</b> Educators casually interact with one another and network. This allows each educator to discover one or two things about another educator.	A whiteboard, dry erase markers, and dry erase board eraser are used. These are utilized to write out instructions and the timing for the networking period.
This exercise gives the workshop leader and every workshop member a chance to learn about other instructors at the workshop.	<b>Forming Connections:</b> Teachers get a chance to introduce themselves to their partners and introduce another workshop member to the group.	The whiteboard, dry erase marker, chairs, and dry erase board eraser are used to write instructions for introductions.
The workshop leader holds a lecture to inform workshop members about the field of computer science as a discipline for female English language learners (FELLs).	<b>Raising Awareness:</b> Educators listen to a lecture and ask questions upon completion of the PowerPoint lecture.	The projector, projector screen, laptop, chairs and PowerPoint is utilized to demonstrate the prepared presentation to all workshop members.
Educators learn about activities that include posting to blogger.com, basic html coding, family, language, and culture activities.	<b>Blogging Skill Development:</b> Educators engage in activities that include basic html coding, role models, and family.	Computers, Internet tables, paper, a bowl PowerPoint, projector pens, projector screen, laptop, and chairs are used for all activities.
Instructors learn to integrate learned material into their own curriculum by designing a two-hour workshop for FELLs.	<b>Self-Evaluation:</b> Instructors design a two-hour workshop for female English language learners (FELLs) and present it.	The Internet, laptop, computers, chairs, PowerPoint, tables, projector screen, paper, pens, and projector are used for the workshop.
Teachers independently create a graphic organizer that helps them organize their thoughts on ways to encourage FELLs in their educational institutions.	<b>Independent Classroom Enactment:</b> Educators create a graphic organizer at popplet.com. It includes ideas to engage FELLs.	The projector, projector screen, laptop, Internet, computer, chairs, and tables are used to exhibit the graphic organizer and to brainstorm.
Educators reflect on the learned material and think about the next steps to take in encouraging FELLs.	<b>Reflection:</b> Instructors reflect on the workshop by writing thoughts and feelings on a paper or into a journal.	The pens, paper, chairs tables, and optional \$1 mini journals are necessary for educators to write their reflections.

\* View Appendix for the entire project.

## CHAPTER IV CONCLUSIONS AND RECOMMENDATIONS

### **Conclusions**

There is extensive research on the linguistic challenges of English language learners (ELLs). However, little research has focused on gender and the importance of preparing female English language learners (FELLs) for quality and well paid careers upon completion of high school. Technology is becoming increasingly important in a globally connected world. This also explains the rise in occupation opportunities within the field of computer science (Khoury, 2007). Even though research indicates the need to prepare ELLs, minorities, and females for careers in science (Grossman & Porche, 2014), FELLs are understudied.

English language learners (ELLs) are frequently examined with little regard to gender. Research on female minorities in respect to science education does not account for the linguistic confronts FELLs experience in addition to gender and minority challenges. This highlights the increasing need to not only encourage ELLs, but to particularly support FELLs who not only find themselves balancing languages, culture, and gender roles, but who could tentatively shy away from an enriching academic and professional career in computer science. It is important to equip educators with effective tools and strategies to engage and educate a diverse student population that is interested and encouraged to enter computer science fields.

During the four-hour workshop, novice educators learn how to effectively use blogs to improve FELLs knowledge of computer science. Educators discover techniques to integrate and scaffold blogging exercises that will help FELLs become more confident in utilizing computers for academic and professional purposes. The four-hour workshop for

novice educators stands as a foundation for new instructors that are ready to empower, encourage, and guide FELLs in pursuing computer science fields.

This field project is central because it acknowledges the unique encounters of FELLs that are encouraged or interested in pursuing computer science fields. Female English language learners (FELLs) consist of a population that has to confront conventional gender representations in science and linguistic demands. It is crucial that novice teachers are prepared to support and encourage this distinctive population by providing them with effective foundational skills.

Novice teachers in high school have to be prepared to serve students from various backgrounds. Research by (Lee, 2005), has focused on helping teachers understand and prepare ELLs for science. However, female English languages learners' (FELLs) unique challenges have not been addressed. In the four-hour workshop, new teachers discover skills that benefit them in preparing FELLs for computer science, a field with increasing job prospects (Khoury, 2007). New teachers need catered support and opportunities to learn among other novice educators. The learned skills can be graciously applied with FELLs in high school and should encourage teachers to create positive relationships with learners and their families. A skilled and equipped new teacher can utilize his or her ambition to connect with students and their families to help learners stay motivated and determined toward their goal of entering computer science.

This project directly addresses the needs of females in computer science. Research conveyed the inexperience and heightened anxiety among females when working with computers (Broos, 2005; Jun & Freeman, 2010; Stoilescu & Egodawatte, 2010; Stoilescu & McDougall, 2011). In order to lower FELLs' anxieties, teachers are instructed to learn about ways to integrate blogging into the classroom. However, in this project, blogging is

not solely utilized to create written content, but to provide insight into html codes, integrate students' cultural background, foster collaboration, and the use of computers. The combination of skills gives students an opportunity to use computers for a variety of tasks, which in turn increases learners' level of confidence.

### **Recommendations**

It is integral to evaluate any curriculum that is utilized for educational purposes. The workshop specifically addresses novice high school teachers who work with diverse student populations. It is designed to help female English language learners (FELLs) that are interested and encouraged to enter computer science fields. The workshop is catered toward high school students, but can be adapted to a variety of learners depending on the students' needs.

The four-hour workshop should be held with teachers who are interested in utilizing technology in the classroom. It is expected that educators that use the provided workshop curriculum have an interest in preparing students for computer science or science, technology, engineering, or math related careers. While this workshop directly addresses computer science, it is expected to be adapted for female English language learners (FELLs) who would like to pursue any STEM related field. In an attempt to use this workshop for a field other than computer science, it is important that the introductory thirty-minute lecture and the computer related activities are eliminated or supplemented with other materials. However, the cultural specific tasks, the implementation of role models, and strategic encouragement can be applied to any STEM related field.

The thirty-minute lecture provides PowerPoint slides for educators to follow the speech of the workshop leader. At the end of the PowerPoint, teachers receive an opportunity to ask questions. While this is the only time educators are explicitly asked if



they have any questions, it is certainly not the only instance questions can be asked.

Throughout the workshop, the workshop leader answers spontaneous questions.

Educators are given various chances to confidently partake in the workshop. If the lecture has to be shortened because of time constraints, it is integral to still highlight the job prospects in computer science and the skills students learn when choosing computer science as their desired discipline. This is important because students have to be aware of the opportunities in the field and the abilities they are going to possess when selecting computer science as their field of study or as a preferred career.

The workshop is intended for novice teachers in high school; however, when working with experienced teachers it is still of utmost importance to cover the entire curriculum. Because experienced teachers often already possess deep embedded opinions, the approach of the workshop should rest on fostering encouraging discussions and ways to implement new strategies they believe could help develop the skills of female English language learners (FELLs). If resistance occurs, it is integral to remind experienced educators that working with computers is necessary in today's society and that every time spend on the computer, is time that helps develop students for demanding future professions that inevitably desire basic or even advanced computer skills.

The workshop is intended to benefit novice teachers in high school. Most of the activities are practical and student-centered. When working with FELLs or other student populations that are in middle school it is important to integrate games into the workshop curriculum. Games will keep younger students engaged and interested. For instance, the role-model biography strip competition can be further made into a guessing or jeopardy game. If there is enough time, this might also work with high school students; however, it

is significant to maintain a level of seriousness to help students prepare for their careers upon high school graduation.

The methodology that is used within the workshop considers the linguistic and cultural backgrounds of students. In addition, educators that would like to work with teachers that work in schools with bilingual curriculum can prepare to invite a bilingual workshop assistant that is able to provide translations during the workshop. This allows workshop leaders to reach a larger population of educators that work with female English language learners (FELLs).

Blogging is becoming increasingly relevant and useful within educational institutions. While blogger.com among other online publishing platforms customarily stand for writing, this workshop applies a methodology that utilizes blogging as a way to investigate and understand basic html codes. This realization can encourage educators to further discover html codes within other publishing tools. The workshop utilizes blogger.com to educate novel teachers in high school about basic html coding. However, the methods that are presented within the workshop can be utilized with other relevant blogging platforms.

The framework of the workshop is based on the family systems theory. As a result, the workshop is focused on involving family members in a way that helps female English language learners (FELLs) better connect with computer science, as well as receive the support they need to persevere through the challenging times. The workshop can also be based on social learning theory or attribution theory. It depends on the larger goal of the workshop and the student population that is involved. If the emphasis were solely on students' self-efficacy, the recently mentioned theories would be relevant as a framework for the workshop. However, with family systems theory as the outline for this four-hour

workshop, it is important that activities and exercises consider students' family. While the computer science parent night provides a direct link to learners' parents, it is understood that parental availability is not always certain. Therefore, it is crucial to provide FELLs with opportunities to independently share their language, culture, and family background through family oriented activities.

The techniques that are utilized within the workshop are specifically designed to assist the linguistic and cultural backgrounds of female English language learners (FELLs). Most activities are scaffolds; require critical thinking, and reading and writing skills. This is integral in helping FELLs become comfortable in expressing themselves in English. In addition, most exercises require written blog posts and research skills, which are significant for all students. The overarching concept of the whole workshop is the ability for educators to directly apply learned material to their own FELL population.

The pedagogical methods that are used within the workshop are primarily student-centered. It is expected that educators and learners become autonomous learners after being exposed to the dynamic activities. In today's rapidly changing world it is not enough to wait for information to appear. Students have to get inspired in order to seek out information independently. They have to be able to develop their skills beyond what they learn in their classrooms. It is recommended that educators expose students to a variety of activities and information in order to spark students' interest and to develop a desire in them to further their studies autonomously.

Females are part of the ELL population and; therefore, have to confront linguistic and gender challenges. It is of utmost importance that educators perceive the need to aid this particular population in making desirable career choices. Without proper preparation and an increased awareness of what is possible for them, female English language

learners (FELs) are apt to overlook a career in computer science. Nevertheless, educators have to instruct students with an array of needs, which could ultimately result in difficulties when adapting materials to fit all of their students. The suggested materials are designed to fit the needs of a diverse student population. While the workshop curriculum is created to address the needs of FELs, it does not exclude the needs of the common student.

The workshop curriculum expects educators to utilize technology. However, a variety of activities and handouts can be applied without the use of technology. Teachers that do not have the desired technological tools can make adaptations for their student population. All of the handouts can be printed and handed to students. In addition, the reading exercise, the graphic organizer, and other suggested materials could be utilized in a traditional classroom without technology. Nevertheless, the effectiveness of preparing female English language learners (FELs) for computer science fields could be compromised without available computers. Knowledge of the field and enriching discussions that integrate the students' language, culture, and family background can give FELs a solid foundation for further self-sufficient preparation.

Female English language learners (FELs) haven't received enough attention in regards to computer science fields. However, English language learners (ELLs) are among the fastest growing population in the United States (Albers, Hoffman & Lundahl, 2009), which inevitably demonstrates the need to encourage the female population among them. Innovative ideas are waiting to be discovered, which could come from this unique population. Educators lack knowledge of the computer science discipline (Khoury, 2007). In addition, the gender gap in computer science persists, with projects such as "Girls Who Code" (Dockterman, 2014) that eagerly try to attract more females to computer science

fields. However, female English language learners (FELs) do not only identify as females, they also recognize themselves as an ELL. Failing to admit the unique challenges this population encounters when selecting an appropriate career, is equal to disregarding the prominence of attracting more students to computer science fields. There is an incredible need for qualified and motivated students that are ready to learn, problem-solve, and innovate.

Educators have to be able to adjust the workshop curriculum to an array of students. While this workshop is specifically designed for female English language learners (FELs), materials can be utilized or adjusted for any relevant student population.

The project is a practical four-hour workshop for novice teachers in high school within the United States. Nevertheless. The workshop content could be applied in other countries outside of the United States. The blogging activities, such as posting to the blog, depicting html codes, and discussing the field of computer science in relation to family and culture allow educators to confront their own gaps in computer science and computer literacy. Novice teachers in high school discover ways to empower female English language learners (FELs) to enter computer science fields. The main variables that are utilized to strengthen participants' confidence in the workshop are collaborative team building exercises and diverse pair and group work.

The variables that indicate whether or not the workshop effectively helped prepare novice teachers to encourage FELs in high school depends on the two-hour self-created workshop that educators design for FELs and the feedback they receive thereof. In addition to the outcomes of pair, group, and whole class activities, as well as the graphic organizer that instructors prepare for their independent classroom enactment within their own school communities. The purpose of the collaborative

activities, is to help educators become aware of the reduced pressure that is experienced during pair, group, and whole class work and to experience the enriched exchange that allows for a learning curve beyond the intended curriculum of the workshop leader.

Novice teachers in high school who are determined to reach a diverse student population benefit from preparing FELLs for fields that require confidence and computer skills.

The workshop is designed for novice teachers in high school that are eager to encourage FELLs to enter computer science fields. While FELLs are instructed by a variety of teachers, novice educators are frequently motivated and determined to apply contemporary strategies to help their students succeed. It is integral to help novice teachers design lessons that reach all student populations regardless of their linguistic or cultural background. Novel educators need to be aware of the unique needs of FELLs in order to immediately address the essentials of every student within their classrooms. Because novice teachers do not have a clear concept or predisposition about specific tools, this population is increasingly apt to utilize technology and linguistic and cultural specific strategies to prepare every student for any career.

The four-hour workshop covers an in-depth curriculum that could span over the intended time. Educators can adapt the timing as necessary to assure effectiveness within their own expected time constraints. However, in order to allow instructors to attain and discover information, as well as digest it, four-hours were selected for this workshop. Nevertheless, the workshop could also be completed over the course of three days.

Educators get a variety of opportunities to design and discuss learned materials. This gives the workshop leader a chance to evaluate what instructors understand throughout the workshop and how they might apply learned information. In addition, instructors also create a two-hour workshop for female English language learners

(FELLS) in their own educational institutions, which gives the workshop leader insights into what teachers have learned and the dynamics of their own student population.

The workshop leader is able to assess what educators have learned throughout the workshop. During the activities, the workshop leader observes teachers and provides constant feedback. The workshop leader receives an obvious idea of the educators' needs and gaps. In addition, during the self-evaluation phase, instructors can vividly demonstrate their own creativity, their abilities to utilize technology for learning, and their skills in reapplying learned material from the workshop.

The reflection phase allows educators to digest the learned material on an emotional level. While the information is not accessible to the workshop leader, it still gives educators a chance to assess their feelings toward the learned material, as well as an outlet to gather strength to continue the undertaking of encouraging female English language learners (FELLS) to enter computer science fields.

The overall effectiveness of the workshop is exhibited throughout the entire four-hour workshop and in the end of the workshop. Once educators complete their individual reflections, they also complete an anonymous workshop evaluation. This information is used to investigate the parts of the workshop that helped educators gather new information and confidence, as well as the parts that did not resonate with instructors. Furthermore, each section of the workshop allows instructors to collaborate and reflect upon an activity. During these times the workshop leader has to observe educators to evaluate the effectiveness of the completed activity.

In small groups, educators design a two-hour workshop for female English language learners (FELLS). The guidelines of the activity encourage educators to

include activities that were not learned in the workshop. The self-created ideas are an indication that educators are starting to build upon learned material. This is also a crucial determinant of the effectiveness of the workshop. It is increasingly important that instructors learn or refresh their skills and stay motivated and ready to individualize their activities to suit their own particular student population in their educational institutions.



## REFERENCES

- Albers, C. A., Hoffman, A. J., & Lundahl, A. A. (2009). Journal coverage of issues related to English language learners across student-service professions. *School Psychology Review, 38*(1), 121-134.
- Augustine, N. (2008). Rising above the gathering storm: energizing and employing America for a brighter economic future. National Academy Press, Washington, DC
- Baker, D. d. (2013). What works: using curriculum and pedagogy to increase girls' interest and participation in science. *Theory Into Practice, 52*(1), 14-20.  
doi:10.1080/07351690.2013.743760
- Banerjee, S., & Santa Maria, R. R. (2012). A study of students' perception of computer education: Lack of interest in STEM fields for female students. *International Journal Of Technology, Knowledge & Society, 8*(4), 93-106.
- Beautiful and easy to use newsletters | Smore. (n.d.). Retrieved December 1, 2014, from <https://www.smores.com/>
- Birol, C., Bekirogullari, Z., Etc, C., & Dagli, G. (2009). Gender and computer anxiety, motivation, self-confidence, and computer use. *Eurasian Journal Of Educational Research (EJER), (34)*, 185-198.
- Blackstone, B., Spiri, J., & Naganuma, N. (2007). Pedagogical uses and student responses. *Reflection on English Language Teaching, 6*(2), 1-20.
- Broos, A. (2005). Gender and information and communication technologies (ict) anxiety: Male self-assurance and female hesitation. *Cyberpsychology & Behavior, 8*(1), 21-31.  
doi:10.1089/cpb.2005.8.21
- Capps, R., Fix, M., Murray, J., Ost, J., Passel, J. S., Herwantoro, S., & Urban Inst., W. C. (2005). The new demography of America's schools: Immigration and the no child left behind act. *Urban Institute,*

- Cheryan, S., Drury, B. J., & Vichayapai, M. (2012). Enduring influence of stereotypical computer science role models on women's academic aspirations. *Psychology of Women Quarterly*, 0361684312459328.
- Cheryan, S., Plaut, V. C., Handron, C., & Hudson, L. (2013). The stereotypical computer scientist: Gendered media representations as a barrier to inclusion for women. *Sex roles*, 69(1-2), 58-71.
- Christensen, R., Knezek, G., & Tyler-Wood, T. (2014). Student perceptions of science, technology, engineering and mathematics (STEM) content and careers. *Computers In Human Behavior*, 34173-186. doi:10.1016/j.chb.2014.01.046
- computer science. 2014. In *Merriam-Webster.com*. Retrieved November 18, 2014, from <http://www.merriam-webster.com/dictionary/computer+science>
- Davi, A., Frydenberg, M., & Gulati, G. J. (2007). Blogging across the disciplines: Integrating technology to enhance liberal learning. *MERLOT Journal of Online Learning and teaching*, 3(3), 222-233.
- Dockterman, E. (2014). Cracking the girl code. *Time*, 184(6), 44.
- Edmonds, L. M. (2009). Challenges and. Cahllenges and solutions for ELLs: Teaching strategies for English language learners' success in science. *The Science Teacher*, 30-33.
- Fedorowicz, J., Vilvovsky, S. G., & Golibersuch, A. J. (2010). Gender differences in teenagers' elective use of computer technology. *Communications Of The Association For Information Systems*, 2727-44.
- Foroutan, M., Noordin, N., & bin Hamzah, M. G. (2013). Weblog promotes ESL learners' writing autonomy. *Journal Of Language Teaching & Research*, 4(5), 994-1002. doi:10.4304/jltr.4.5.994-1002

- Gal-Ezer, J., & Stephenson, C. (2010). Computer science teacher preparation is critical. *ACM Inroads*, 1(1), 61-66.
- Gal-Ezer, J., & Stephenson, C. (2009). The current state of computer science in US high schools: A report from two national surveys. *Journal for Computing Teachers*, 1-5.
- Google. (n.d.). Retrieved December 1, 2014, from <http://www.blogger.com/>
- Griffith, A. L. (2010). Persistence of women and minorities in STEM field majors: Is it the school that matters?. *Economics Of Education Review*, 29(6), 911-922.
- Grossman, J., & Porche, M. (2014). Perceived gender and racial/ethnic barriers to STEM success. *Urban Education*, 49(6), 698-727. doi:10.1177/0042085913481364
- Guess, C. D. (2004). Decision making in individualistic and collectivistic cultures. *Online readings in psychology and culture*, 4(1), 3.
- Hohlfeld, T. t., Ritzhaupt, A. a., & Barron, A. b. (2013). Are gender differences in perceived and demonstrated technology literacy significant? It depends on the model. *Educational Technology Research & Development*, 61(4), 639-663. doi:10.1007/s11423-013-9304-7
- Hon Keung, Y., & Alison Lai Fong, C. (2012). Gender difference of confidence in using technology for learning. *Journal Of Technology Studies*, 38(2), 74-79.
- Howland, J.L., & Jonassen, D., & Marra, R.M. (2012). *Meaningful Learning with Technology* (4<sup>th</sup> ed.). Boston, MA: Pearson Education.
- Huffman, A. H., Whetten, J., & Huffman, W. H. (2013). Using technology in higher education: The influence of gender roles on technology self-efficacy. *Computers In Human Behavior*, 29(4), 1779-1786. doi:10.1016/j.chb.2013.02.012
- Johnson, J., Yerrick, R., & Kearney, E. (2014). Supporting linguistically diverse students in an era of science education reform. *Science Scope*, 37(5), 23-31.

- Jun, H., & Freeman, L. A. (2010). Are men more technology-oriented than women? The role of gender on the development of general computer self-efficacy of college students. *Journal Of Information Systems Education, 21*(2), 203-212.
- KewalRamani, A., Gilbertson, L., Fox, M., & Provasnik, S. (2007). *Status and trends in the education of racial and ethnic minorities* (NCES 2007– 039). Washington, DC: National Center for Education Statistics, Institute of Education Sciences, U.S. Department of Education.
- Khoury, G. (2007). Computer science state certification requirements csta certification committee report. *Computer Science Teacher Association, 1*
- Komarraju, M. M., & Nadler, D. D. (2013). Self-efficacy and academic achievement: Why do implicit beliefs, goals, and effort regulation matter? *Learning And Individual Differences, 25*67-72. doi:10.1016/j.lindif.2013.01.005
- Lacey, T.A., & Wright, B. (2009). Occupational employment projections to 2018. *Monthly Labor Review, 132*(11), 82-123. Retrieved from: <http://www.bls.gov/opub/mlr/2009/11/art5full.pdf>
- Lee, O. (2005). Science education with English language learners: Synthesis and research agenda. *Review of Educational Research, (4)*. 491.
- Liu, Y., Lou, S., & Shih, R. (2014). The investigation of STEM self-efficacy and professional commitment to engineering among female high school students. *South African Journal Of Education, (2)*, 1.
- Luehmann, A., & MacBride, R. (2009). Classroom blogging in the service of student-centered pedagogy: Two high school teachers' use of blogs. *THEN: Technology, Humanities, Education, & Narrative, 6*, 5-36.
- Manzo, R., Cruz, L., Faltis, C., & de la Torre, A. (2011). Professional development of secondary science teachers of English learners in immigrant communities. *AMAE*

*Journal*, 5(1), 41-48.

McDonnough, J. T., & Cho, S. (2009). Making the connection: practical techniques for accommodating English Language Learners in the science classroom. *The Science Teacher*, (3).

(n.d.). Retrieved October 12, 2014, from <http://www.merriam-webster.com>

Oh, S., & Lewis, G. (2011). Stemming inequality? Employment and pay of female and minority scientists and engineers. *Social Science Journal*, 48(2), 397-403.

doi:10.1016/j.soscij.2010.11.008

Padlet is the easiest way to create and collaborate in the world. (n.d.). Retrieved

December 1, 2014, from <https://padlet.com/>

Petty, L. L., & Narayan, R. (2012). Investigating secondary science teachers' beliefs about multiculturalism and its implementation in the classroom. *Multicultural Perspectives*, 14(4), 212-219. doi:10.1080/15210960.2012.725327

Popplet for School. (n.d.). Retrieved December 1, 2014, from <http://popplet.com/>

Porter, L., Guzdial, M., McDowell, C., & Simon, B. (2013). Success in introductory programming: what works?. *Communications Of The ACM*, 56(8), 34-36.

doi:10.1145/2492007.2492020

President's Council of Advisors on Science and Technology. (2012, February 7). Engage to excel: Producing one million additional college graduates with degrees in science, technology, engineering, and mathematics. A Report by the President's Council of Advisors on Science and Technology. Retrieved from

[http://www.whitehouse.gov/sites/default/files/microsites/ostp/fact\\_sheet\\_final.pdf](http://www.whitehouse.gov/sites/default/files/microsites/ostp/fact_sheet_final.pdf)

Sinclair, S. S., & Carlsson, R. R. (2013). What will I be when I grow up? The impact of gender identity threat on adolescents' occupational preferences. *Journal Of*

*Adolescence*, 36(3), 465-474. doi:10.1016/j.adolescence.2013.02.001

Stoilescu, D., & Egodawatte, G. (2010). Gender differences in the use of computers, programming, and peer interactions in computer science classrooms. *Computer Science Education*, 20(4), 283-300.

Stoilescu, D., & McDougall, D. (2011). Gender digital divide and challenges in undergraduate computer science programs. *Canadian Journal Of Education*, 34(1), 308-333.

Sun, Y. C. (2010). Extensive writing in foreign-language classrooms: A blogging approach. *Innovations in Education and Teaching International*, 47(3), 327-339.

"Theory." *The Bowen Center*. The Bowen Center for the Study of the Family, n.d. Web. 01 Dec. 2014. <<http://www.thebowencenter.org/theory/>>.

United States Government Accountability Office (2005). Higher Education: Federal Science, Technology, Engineering, and Mathematics Programs and Related Trends (GAO-06-114). Retrieved from <http://www.gao.gov/new.items/d06114.pdf>

Williams, J. B., & Jacobs, J. (2004). Exploring the use of blogs as learning spaces in the higher education sector. *Australasian journal of educational technology*, 20(2), 232-247.

Wilson, C. (2013). What's up next for code.org?. *Computer*, 46(8), 95-97.

doi:10.1109/MC.2013.292

(2013, November). Inspiring girls with stem. *NSTA Reports!*. pp. 20-21.

APPENDIX

**Empowering Female English Language Learners to Pursue Computer Science**

**Fields:**

**A Practical 4-Hour Workshop for Beginning Teachers in High School**

by

Osaro Althouse

## Table of Contents

	Page
Workshop Outline .....	2
Reducing Unfamiliarity .....	3
Forming Connections.....	4
Raising Awareness.....	5
PowerPoint Presentation .....	7
Blogging Skill Development.....	15
Basic HTML Coding.....	18
Role Models .....	20
Family Involvement .....	26
Self-Evaluation .....	36
Computer Science Peer Evaluation Form .....	38
Independent Classroom Enactment.....	39
Reflection .....	40
Overall Workshop Evaluation.....	42



## Workshop Outline:

<b>Purpose</b>	<b>Practice</b>	<b>Materials</b>
Educators get a chance to interact with other workshop members. This helps in establishing harmony among all members of the workshop.	<b>Reducing Unfamiliarity:</b> Educators casually interact with one another and network. This allows each educator to discover one or two things about another educator.	A whiteboard, dry erase markers, and dry erase board eraser are used. These are utilized to write out instructions and the timing for the networking period.
This exercise gives the workshop leader and every workshop member a chance to learn about other instructors at the workshop.	<b>Forming Connections:</b> Teachers get a chance to introduce themselves to their partners and introduce another workshop member to the group.	The whiteboard, dry erase marker, chairs, and dry erase board eraser are used to write instructions for introductions.
The workshop leader holds a lecture to inform workshop members about the field of computer science as a discipline for female English language learners (FELLs).	<b>Raising Awareness:</b> Educators listen to a lecture and ask questions upon completion of the PowerPoint lecture.	The projector, projector screen, laptop, chairs and PowerPoint is utilized to demonstrate the prepared presentation to all workshop members.
Educators learn about activities that include posting to blogger.com, basic html coding, family, language, and culture activities.	<b>Blogging Skill Development:</b> Educators engage in activities that include basic html coding, role models, and family.	Computers, Internet tables, paper, a bowl PowerPoint, projector pens, projector screen, laptop, and chairs are used for all activities.
Instructors learn to integrate learned material into their own curriculum by designing a two-hour workshop for FELLs.	<b>Self-Evaluation:</b> Instructors design a two-hour workshop for female English language learners (FELLs) and present it.	The Internet, laptop, computers, chairs, PowerPoint, tables, projector screen, paper, pens, and projector are used for the workshop.
Teachers independently create a graphic organizer that helps them organize their thoughts on ways to encourage FELLs in their educational institutions.	<b>Independent Classroom Enactment:</b> Educators create a graphic organizer at popplet.com. It includes ideas to engage FELLs.	The projector, projector screen, laptop, Internet, computer, chairs, and tables are used to exhibit the graphic organizer and to brainstorm.
Educators reflect on the learned material and think about the next steps to take in encouraging FELLs.	<b>Reflection:</b> Instructors reflect on the workshop by writing thoughts and feelings on a paper or into a journal.	The pens, paper, chairs tables, and optional \$1 mini journals are necessary for educators to write their reflections.

Empowering Female English Language Learners to Pursue Computer Science Fields:

A Practical 4-Hour Workshop for Beginning Teachers in High School

*\*Terminology: Workshop members are also referred to as educators, teachers, or instructors.*

### **Reducing Unfamiliarity**

**Purpose:** This segment helps educators prepare for subsequent pair, group, and whole workshop activities. During this time, teachers are provided with an open space to casually interact with other educators. The workshop leader receives an opportunity to look for harmony among instructors. This helps to group educators for the first collaborative exercise. The purpose of this phase is for educators to get to know one another and network.

**Materials:** Whiteboard, dry erase marker, and dry erase board eraser.

The materials are utilized to write a few sentences. The workshop leader writes a short introduction for the “reducing unfamiliarity” phase as seen under “process” below.

**Optional materials:** Plastic cups, water, juice, and tissues, as well as three tables with a table cover to place liquids and appetizers. The optional materials help provide snacks for educators that may have missed breakfast. Moreover, food brings people together and often naturally helps establish a warm and welcoming ambience.

**Period:** 8:30AM – 9:00 AM

**Objective:** By the end of this period, educators will be able to recall a minimum of three names of other teachers.

**Collaboration:** This part focuses on the people who are involved during the “reducing unfamiliarity” phase. It involves the workshop leader and the educators. All

members of the workshop are going to interact spontaneously.

**Grouping:** Educators work independently.

**Process:** This portion lists the steps of the “reducing unfamiliarity” phase.

First, the workshop leader writes a short introduction onto a whiteboard, as seen below.

Welcome!

Please feel free to have something to drink / appetizers.

The formal workshop begins at 9:00AM.

Get to know other passionate educators before we start the formal four-hour workshop.

Next, all workshop members are offered nametags and refreshments. Then, the educators and workshop leader casually network and interact while eating refreshments. Lastly, educators are called together to begin the formal workshop.

### **Forming Connections**

**Purpose:** This segment of the workshop focuses on getting to know every educator’s background, teaching status, and reasons for partaking in the workshop. After or before every educator introduces another teacher, he or she is able to gather information about every workshop member. This portion is primarily intended as an icebreaker.

**Materials:** Whiteboard, dry erase marker, chairs, and dry erase board eraser.

The materials are utilized to write introduction questions for all educators during the “forming connections” phase. The workshop leader writes four questions onto the whiteboard that are answered by each educator, as seen under “process” below.

**Period:** 9:00 AM – 9:20 AM

**Objective:** By the end of the period, educators will be able to recall the name and teaching situation of four other teachers. Instructors will also recall the name of the

workshop leader, as well as the reasons for her or him holding the workshop.

**Collaboration:** This part focuses on the people who are involved during the “forming connections” phase. Educators primarily work in pairs and report back to all workshop members. The workshop leader reports to the group at the end.

**Grouping:** Educators work in pairs. The workshop leader prepares a compound noun matching activity that randomly pairs teachers. Instructors draw a slip of paper from a bowl that has part of the compound noun. Teachers then search for their partner by finding the missing part of the compound noun. For instance, one teacher draws “basket” and another draws “ball.” These two instructors are partners for the exercise.

**Process:** This portion lists the steps for the “forming connections” phase. First, educators are asked to get in pairs. Next, each pair answers the following questions and then introduces their partners by providing their partner’s answers to all members of the workshop:

1. What is your name?
2. What is your current teaching situation?
3. Why did you decide to partake in this workshop?
4. What do you hope to get out of this workshop?

Once every educator introduced another instructor, the workshop leader introduces him or herself by providing his or her name, personal reasons for holding the workshop, and gratitude for educators’ presence.

### **Raising Awareness**

**Purpose:** This segment provides a thirty-minute lecture about the opportunities in computer science fields and factual information to raise educators’ awareness of the need

to empower female English language learners to enter computer science fields.

**Materials:** Projector, projector screen, laptop, chairs, and PowerPoint.

The materials are used to allow every educator to view the created power point presentation. Participants are gathered in a semi-circle to view the presentation.

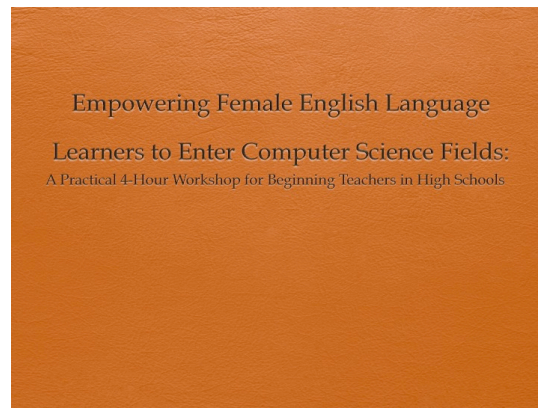
**Period:** 9:20 AM – 9:50 AM

**Objective:** By the end of this period, educators will be able to define computer science, list two skills students learn when entering the computer science discipline, and be able to retell the job prospects in computer science fields.

**Collaboration:** This part focuses on the people who are involved in speaking during the thirty-minute lecture. The workshop leader takes the lead to provide valuable factual information about the field of computer science and suggests ways to empower female English language learners. At the end of the lecture, educators are able to ask questions. PowerPoint slides are demonstrated, followed by brief explanations.

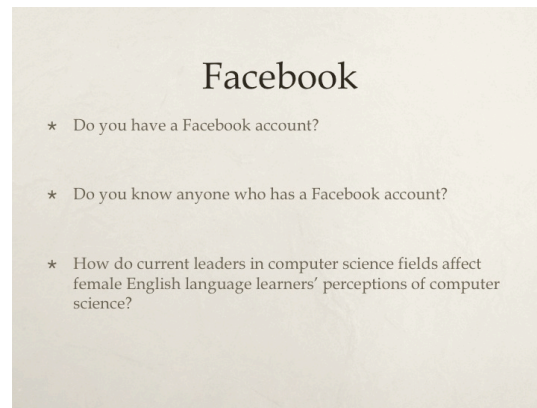
**Grouping:** Educators listen independently to the lecture.

**Process:** Educators listen to a thirty-minute lecture on the importance of getting female English language learners ready for computer science fields. While the workshop leader speaks, a PowerPoint is shown to highlight key points. Finally, instructors get an opportunity to ask questions.



### Slide 1

I would like to welcome you again to the practical four-hour workshop on empowering female English language learners to enter computer science fields. I like to start with an overarching overview of the content of today's workshop. We start with a lecture that I'm about to present, followed by practical blogging exercises, and a short self-assessment. We then finish with a discussion on your individual possibilities for enactment in your own educational settings followed by a reflection exercise. We have a fifteen-minute break after the blogging exercises to recharge and eat refreshments.



### Slide 2

We now continue with the workshop. Who has a Facebook account in this room? Who knows someone that has a Facebook account? Most of you are familiar with the creator of Facebook, Mark Zuckerberg. All of us have likely noticed the vast involvement on social media sites, such as Facebook. The question; however, is what do female English language learners know and think about computer science? According to the Computer Science Teacher Association (CSTA), numerous states in the United States do not have a lucid definition or perception of the field of computer science and often confuse it with other subjects, such as educational technology. Therefore, we will resume with a definition of computer science.

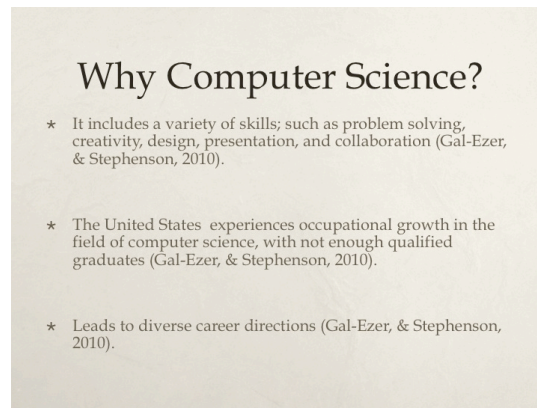
## What is Computer Science?

- \* According to the online Merriam Webster dictionary, computer science is the “study of computers, their design and their uses for computation, data processing, and systems control, including design and development of computer hardware and software, and programming. The field encompasses theory, mathematical activities such as design and analysis of algorithms, performance studies of systems and their components, and estimation of reliability and availability of systems by probabilistic techniques. Because computer systems are often too large and complicated for failure or success of a design to be predicted without testing, experimentation is built into the development cycle.”

### Slide 3

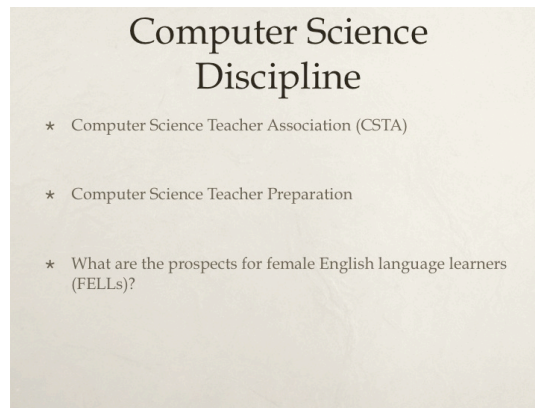
What is computer science? According to the online Merriam Webster dictionary, computer science is the “study of computers, their design and their uses for computation, data processing, and systems control, including design and development of computer hardware and software, and programming. The field encompasses theory, mathematical activities such as design and analysis of algorithms, performance studies of systems and their components, and estimation of reliability and availability of systems by probabilistic techniques. Because computer systems are often too large and complicated for failure or success of a design to be predicted without testing, experimentation is built into the development cycle.”





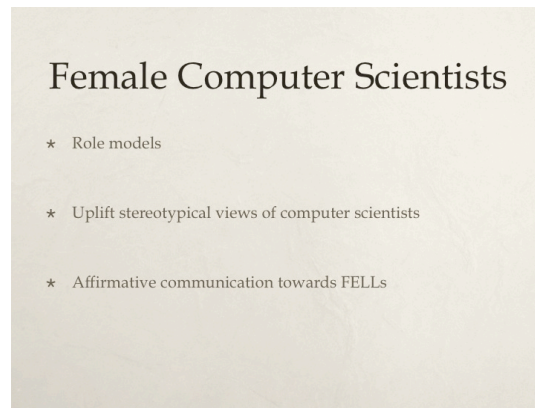
#### Slide 4

The field of computer science is very dynamic. Female English language learners learn a variety of skills when selecting computer science as a field. According to Gal-Ezer and Stephenson (2010), it incorporates problem solving, creativity, presentation, design, and collaboration. Furthermore, United States has been experiencing an array of occupational opportunities in the field of computer science with limited people who are qualified enough to enter the field. Female English language learners do not only have a chance to close the gender gap, but to enter a field that experiences job growth. In addition, computer science can lead to a variety of careers, as mentioned by Gal-Ezer and Stephenson (2010), which can benefit female English language learners as they consider academic and professional goals.



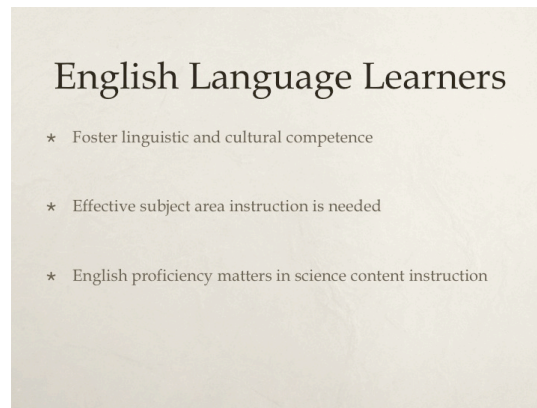
### Slide 5

We have to start with a clear idea of what the field of computer science encompasses. How many of you have a computer science discipline in your high school? CSTA states that most K-12 systems do not have a computer science discipline and that elements of computer science are taught under distinct titles (Khoury, 2007). Realizing this can help all of you establish a clear connection for students to help identify necessary skills for students who would like to enter the field of computer science. CSTA also highlights that the majority of educators who do teach computer science lack the essential preparation. It is stated that a limited number of states have established benchmarks for the preparation of computer science teachers (Khoury, 2007). It is; therefore, important that educators take the necessary steps to prepare themselves to help populations that without the institutional support would not find the courage to pursue computer science fields. This directs us to the question of the day: What are the prospects for female English language learners and how can we support them in entering computer science fields?



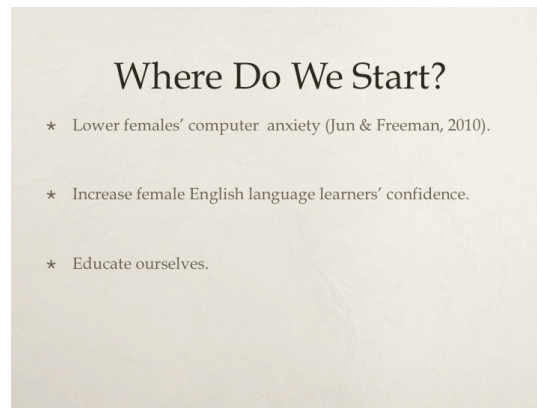
### Slide 6

We know that males have conventionally governed the fields of science and engineering (Liu, Lou & Shih, 2014). As a result, most female students are hesitant to enter science fields, especially if they do not know any females that have done so and succeeded. As educators, we can create opportunities for female English language learners to connect with enthusiastic and positive female computer scientists. Family gender roles also play a crucial role when females decide to enter computer science. The conflict of going against what is seen as ‘normal’ could discourage females to enter computer science fields (Grossman & Porche, 2014). As a result, exposure to female role models that have succeeded in computer science can uplift the stereotypical views of what is seen as an appropriate profession for females. Stoilescu and Egodawatte (2010) found that male learners had a higher level of self-assurance and less angst in utilizing programming and computers compared to their female counterparts in an undergraduate computer science program. If females receive adequate instruction and encouragement in high school, they can develop confidence and skills to stay motivated in college or university. Research shows that affirmative communication from family, counselors, and educators about science, technology, engineering, and math can reduce biased ethnic, racial and gender perceptions (Grossman and Porche, 2014).



### Slide 7

What do we know about English language learners? It is especially important for English language learners in high school to receive catered encouragement in all subject areas while they are improving their English skills (McDonnough & Cho 2009). The linguistic abilities of English language learners are integral to successfully prepare these students for computer science. In Lee (2005), it is stated that a rising student population consists of immigrants who require educators that specifically address the instructive needs of learners who are obtaining linguistic, cultural, and academic necessities simultaneously. In addition, it is claimed that English language learners need to be able to acquire linguistic and literacy skills in conjunction with subject area education. It is important that ELLs get a chance to develop their linguistic, literacy, and content skills in order to open opportunities for this student population to enter science fields. Lee (2005) also highlights that if English language learners learn science in English that it is directly connected to the students' English proficiency.



### Slide 8

The research clearly demonstrates that it is to female English language learners' advantage if they are introduced to computer science as early as feasible and that their linguistic background has to be considered when preparing them for science fields. Female English language learners have to feel comfortable with computers in order to take the necessary steps to enter computer science fields. Knowledge of computer science will also help female English language learners build confidence, along with role models and an abundance of family support. In order to include every beginning educator regardless of the content they teach in high school, we will utilize blogging as a primary way to introduce female English language learners to the field of computer science. The goal is to get female English language learners comfortable in utilizing computers through written blogging exercises, while also highlighting html coding within blogs. We will now begin with the practical aspects of the workshop. Any questions?

\*Educators raise their hands to ask as many questions as they want answered.

### **Blogging Skill Development**

**Purpose:** This portion of the workshop focuses on developing blogging strategies that involve html coding exercises, pair, group, and whole member activities. Relevant approaches are outlined that include family in supporting female English language learners who show potential or are interested in entering computer science fields. Educators receive training in blogging through varied exercises that consider the cultural and linguistic backgrounds of female English language learners.

**Materials:** Computers, Internet, PowerPoint, projector, projector screen, laptop, chairs, paper, pens, tables, and handouts. These materials are needed because all educators have to be able to utilize a computer and the Internet to access blogger.com and popplet.com. In addition, the projector and the projector screen serve as a reference point for all workshop members. The workshop leader guides educators through the steps on the projector screen. The tables serve as a place for the computers and the chairs are seats at the computers for instructors. Handouts can be virtually accessible to save paper.

**Period:** 9:50 AM – 11:10 AM

**Objective:** By the end of the period, educators will be able to create a blogger account and a graphic organizer at popplet.com. Instructors will also be able to manually post to blogger.com, change picture and video sizes through html codes, as well as create a flyer using PowerPoint. Teachers will be able to recognize how to resize an image through html coding, embed a video through html coding, and create a border around a picture through html coding on blogger.com. Educators will also recall three popular female computer scientists, review and adjust an outlined parent night, and create a role model master plan by answering twenty role model related questions. Educators also get

into two large groups to analyze and discuss two scholarly articles.

**Collaboration:** This part focuses on the people who are involved in “blogging skill development.” Students will work independently, in pairs, in small groups, and in a whole member setting. Educators interact with other teachers through assigned exercises. The workshop leader will monitor and assist instructors.

**Grouping:** Educators work independently when setting up a blog at blogger.com, as well as during the html coding exercise. Teachers also work on their own when they create the role model master plan and the questionnaire that is catered toward female English language learners. Educators are split into two groups for the reading exercise.

Educators work in pairs to create the parent night survey and find their partners through separated phrasal verbs. During the pair work for popular female computer scientists, teachers find their partner by matching a picture with the accurate word. Instructors get a chance to choose their own partners during the language and culture question exercise and when creating the monthly computer science flyer.

The competitive two groups for the strip biography activity is set up by having teachers count from one to two, where group one is one group and group two is another. Educators also get a chance to independently form a group of four through an original pair exercise to exchange questions for a possible parent night survey. Teachers work in groups of five for a discussion and find one another through items that are found in a specific location in a house. For instance, if the location is the kitchen, teachers that draw paper that says Dutch oven, spoon, pan, pot, and fork are all in one group. Lastly, for the small group work on the class blog activity, instructors find their partners by drawing paper that either says a country or a city. For instance, if one teacher draws the country Germany and two other teachers draw the cities Berlin and Hamburg, they are in one

group.

**Process:** Every educator selects a personal computer and signs on to blogger.com.

Once on the blogger.com site, every instructor creates an account and sets up a blog. The steps are outlined on the whiteboard as follows:

1. Go to [www.blogger.com](http://www.blogger.com).
2. Create a Google account by entering your information.
3. Once you have created an account go back to [www.blogger.com](http://www.blogger.com).
4. Enter your username and password and sign in.
5. Click on the tab that reads “New Blog.”
6. Choose a title for your blog and type it into the title box.
7. Create a memorable address that you and others can use to access your blog.
8. Choose a template and click “Create blog!”
9. Click on the tab “View blog.”
10. View the current state of your blog.

Once every educator creates his or her blog, the workshop leader introduces the first blogging exercise. Instructors create their first blog post by answering two of the following questions. Every teacher includes a visual image as part of his or her post.

1. What excites you about working with blogs and what concerns you?
2. How do you feel about using technology with your students?
2. If you have previously used blogs with your students, what did you like about it and what did you dislike?
3. How will blogging possibly affect female English language learners in your educational institution?



Once teachers complete their post, they write their blog address onto the whiteboard and include their name. Each workshop member then responds to two other workshop members' posts. Once every instructor completes this task he or she gets into groups of four. Within the group, educators answer the same questions they answered on the blog. Afterwards, teachers reflect on the different experiences in a whole member setting. The overarching question is: "How did writing your response as a blog post differ from communicating your perspectives and feelings in small groups?" "How do both experiences may affect female English language learners?"

Once everyone completes their discussions, they return to their personal computers and click on their original blog post on blogger.com. Next, instructors click on edit. Then, every teacher clicks on their image and resizes it. Teachers choose between medium, large, and extra large. Once completed, instructors save the changes. Within the blog post educators click on the "html" tab. Now, instructors are asked to change the image size within the html code, instead of through the written section. The workshop leader points out the changes participants make. The word "hello" is used to refer to any text that is written by instructors. Within the html code, participants view something as shown below.

### BASIC HTML CODING

**Purpose:** This exercise gives educators examples of basic html coding. Teachers are able to identify html codes within blogger. This experience, allows instructors to introduce basic html to female English language learners without intimidating them.

Educators are asked to change the size of the image within the html code. The workshop leader demonstrates varied possibilities as shown below.

**Example:** height="292" width="400"

**Example:** height="300" width="500"

Next, instructors are directed to border="0" to change the border lining around their image. Educators can choose any number between zero and hundred.

**Example:** border="0"

Educators decide where to place the image. They manually choose either center, left, or right as shown here.

**Example:** center; ">; left: "<; right: ">

Every teacher decides the proper line breaks that visually appeal to him or her.

**Example:** <br />

The focus then shifts to educators' text. Teachers change the font type.

**Example:** <b>Hello</b> for **bold**

**Example:** <i>Hello</i> for *cursive*

Instructors can then add any text color. "Blue" can be changed to any other color.

**Example:** <span style="color: blue;">Hello</span>

Educators click on compose and add an unwanted caption to their picture. Every instructor goes back to the "html" tab and changes the unwanted caption to a caption they like. In this example "picture" is the unwanted caption. Participants change this segment to another word, phrase, or sentence.

**Example:** <tr><td class="tr-caption" style="text-align: center;">Picture</td></tr>

Teachers open a new tab in their browser and go to YouTube.com. Then, educators

find a computer science related video. Once a specific video is selected, instructors click on the “share” button below the video, then the “embed” tab.

**Example:** <embed> → peripheral function or collaborative content (plug-in)

The embedding code is copied and pasted into the html code within blogger and then viewed in the compose section. Educators go back and choose a size by manually changing the height and width within the html code. Then, instructors post the video.

**Example:** <iframe allowfullscreen="" frameborder="0" height="600" src="//www.youtube.com/embed/8v2Hjr2ktLE?rel=0" width="700"></iframe>

Educators are encouraged to explore more options and alterations independently as they continue working with female English language learners in their classrooms. This newly learned information helps enact the first steps toward self-education of basic html coding. It encourages educators to work with available tools that are understandable.

### ROLE MODELS

**Purpose:** The first exercise introduces educators to popular female computer scientists. This activity gives educators a chance to learn about strategies that include research and computer science simultaneously. Teachers that do not teach computer science can still integrate computer science in a research related activity. The following exercises encourage educators to seek out appropriate role models for their female English language learner population. It also motivates teachers to include female English language learners in the process.

**Activity:** Teachers are asked to pair up with another instructor. In pairs, instructors select one popular female computer scientist from the provided list of names by adding their initials.

This is an example of the popular female computer scientist list

Lixia Zhang	
Jane Xu	
Sophie Wilson	
Mary Allen	
Henrietta Swan Leavitt	
Duy-Loan Le	
Sister Mary Kenneth Keller	
Deborah Estrin	
Fran Berman	
Anousheh Ansari	
Beatrice Helen Worsley	
Meg Whitman	
Padmasree Warrior	
Ginni Rometty	
Rosalind W. Picard	
Lucy Sanders	
Ellen Ochoa	
Margaret Hamilton	
Katherine Johnson	
Carly Fiorina	
Ursula Burns	
Grace Murray Hopper	
Betsy Ancker-Johnson	
Carol Bartz	
Frances E. Allen	
Cynthia Breazeal	
Safra A. Catz	
Irene Greif	
Erna Schneider	
Augusta Ada King	
Katherine Johnson	

Next, educators begin their research on the chosen popular female computer scientist.

After gathering enough information, instructors post an image and a short and appealing biography to their blog. The biography mainly includes significant contributions to the field of computer science. Participants also include how this activity could inspire female

English language learners in the classroom, help foster their linguistic competence, as well as how the information could impact female English language learners' perspectives of computer science. Educators give short two to three minute presentations about their selected popular female computer scientist while sitting at their computers. Afterwards, the workshop leader splits the group into two groups. Each group receives pre-prepared strip biographies and names of the popular female computer scientist that were mentioned during the short presentations. In a short competition, educators are asked to match the names of the popular female computer scientist that appeared within the presentations. The group that correctly matches the information first wins.

This is a short example of the pre-prepared strip biographies.

Carly Fiorina	CEO Hewlett-Packard 1999 – 2005
Ginni Rometty	President and CEO of IBM

Educators each create a short blog post on how the competitive activity could benefit female English language learners linguistically, as well as professionally. Teachers then get into groups of four to orally discuss how both activities, researching and writing about popular females in computer science, as well as recalling learned material through presentations and the strip biography matching exercise could benefit female English language learners that are interested in entering computer science fields. Each group presents their main discussion points to everyone.

Finally, every educator receives the handout of the computer science role model master plan. The computer science role model master plan encourages instructors to think about their own unique ideas of role models and where to get appropriate role models for their female English language learner population. Everyone has a different concept when it comes to role models. What idea works for female English language learners within the

educational institutions of workshop members? What is relevant for female English language learners? Educators take fifteen minutes to read over the questions.

Independently, teachers answer all of the questions. Educators are encouraged to utilize keywords and the Internet if necessary.

<b>Computer Science Role Model Master Plan Questions</b> Who is an appropriate role model for my students (FELLs)?	
1. Who can I consider as a role model for my student population? _____	11. What languages should the role model speak? _____
2. What characteristics are important in a role model? _____	12. What linguistic and cultural background can my students easily connect with? _____
3. Where can I locate role models in the local community? _____	13. What miscellaneous tasks are required to be completed before I can invite a role model? _____
4. How can I connect with famous female computer scientists? _____	14. Where can I connect with other passionate educators who have already invited role models into their classrooms? _____
5. What parents could act as role models? _____	15. What are the specific reasons for inviting role models into my classroom? _____
6. What organizations hold events that include appropriate role models? _____	16. How can I get my students involved in selecting an appropriate role model? _____
7. Do the role models' background, ethnicity, values, age, educational accomplishments, family history, marital status, and more matter when selecting him or her to talk to my students? _____	17. How do I make it relevant to all of my students in the classroom? _____
8. What do female English language learners need to be able to connect to the selected role model? _____	18. How can male role models inspire my female English language learners? _____
9. What students within the school could be appropriate role models? _____	19. What are the academic and professional goals of my students? _____
10. Where can I get help if I need it? _____	20. What other factors do I have to consider when inviting a role model to my class? _____

Educators discuss the questions in a whole member setting. The workshop leader starts by projecting the computer science role model master plan onto the projector

screen. The workshop leader continues with question number one and asks volunteer educators to share their reflections and ideas, while consequently sharing his or hers. It is integral that the workshop leader has a clear idea what he or she would like to contribute during the discussion of the questions. The overarching question is “Who could be an appropriate role model for my students and why?” This question guides all of the listed twenty questions. Once the workshop leader asks all of the questions and has volunteer educators share their answers, teachers are encouraged to continue thinking about the type of role model female English language learners in their classroom community need to feel encouraged and inspired to enter computer science fields.

Instructors create a questionnaire in the form of a blog post that is catered towards female English language learners in their classroom community. The questionnaire gives educators insights into who female English language learners identify as a role model and what they know about the field of computer science. Instructors receive an example handout, but are encouraged to create their own questions on the blog post. Once teachers finish and post their blog post, they are encouraged to choose one question they like to share with everyone. The workshop leader calls on every instructor to share one question. Educators are encouraged to truly reach out to their students upon completion of the workshop in order to choose appropriate role models that are able to inspire female English language learners, as well as other students within their classes.

This is an example of a possible role model questionnaire for students:

Role Model Questionnaire
1. What is a role model?
2. If you could ask a computer scientist anything, what would it be?
3. Can you relate to role models of any age?
4. What do you know about people who are in the field of computer science?
5. If you could invite any computer scientist, who would it be and why?
6. What are the best ways to connect with a role model? (Skype, in person, email, etc.)
7. Do you currently have any role models?
8. Do you know anyone who works in the field of computer science?
9. What characteristics are important in a good role model?
10. Who cannot be a role model and why?

Educators and students have to overcome long held stereotypes of the prototypical computer scientist. Instructors are split into two large groups. Each group receives a scholarly article that they have to read, discuss, and then shares by listing key ideas and facts onto their padlet.com wall. Afterwards, both groups come together and share key points of their scholarly article, as well as opinions on how the learned information could help select appropriate role models for their own female English language learner population. Their padlet.com wall is shared on a blog or through the padlet.com website.

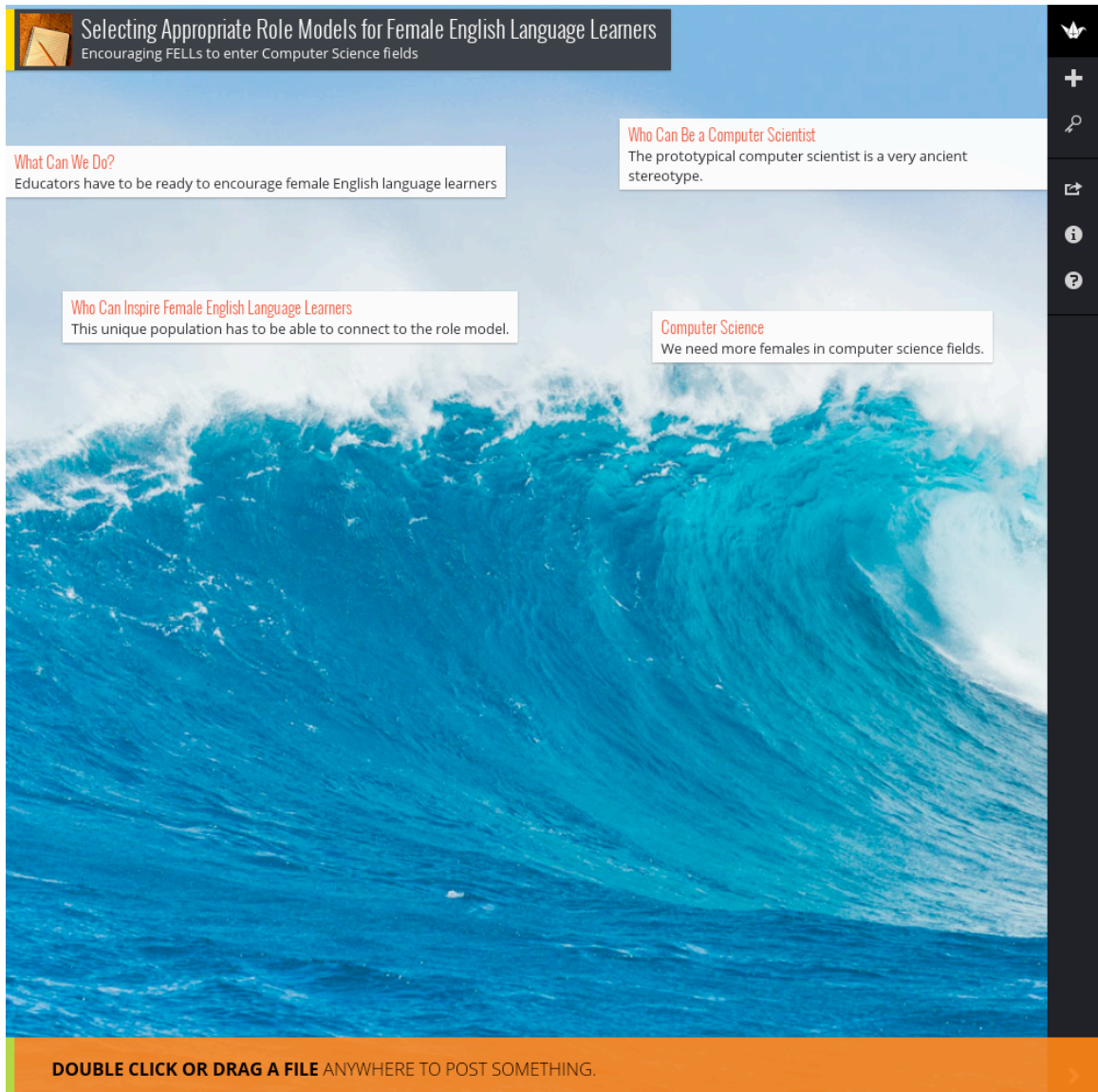
These are the scholarly articles educators read and discuss.

Cheryan, S., Drury, B. J., & Vichayapai, M. (2012). Enduring influence of stereotypical computer science role models on women's academic aspirations. *Psychology of Women Quarterly*, 0361684312459328

Cheryan, S., Plaut, V. C., Handron, C., & Hudson, L. (2013). The stereotypical computer scientist: Gendered media representations as a barrier to inclusion for women. *Sex roles*, 69(1-2), 58-71.



This is an example of a padlet.com wall.



Online tool: padlet.com

### FAMILY INVOLVEMENT

**Purpose:** Female English language learners can't only be understood in isolation, but have to be understood within the context of the family. Educators get in pairs to brainstorm ideas for a monthly virtual computer science flyer. The flyer is posted onto the blog and portrays current news in the field of computer science. It also exhibits

happenings within class by considering the importance of language, culture, and computational experiences of students. When designing the possible monthly virtual computer science flyer, educators think of sections that would invite parents to get involved, as well as ways to encourage female English language learners to share experiences, knowledge, and perspectives of the field of computer science. This activity can be used with students to foster computer skills, writing competency, and knowledge of the field of computer science. Every month two students within class are elected to design and post the monthly computer science flyer to the class blog.

The monthly computer science flyer entails current happenings in the field written by students, short approved biographies of popular computer science role models, occurrences in the school, a pop quiz with upside-down answers, any computer science related interviews that are conducted by students, and any other relevant computer science related incidences.

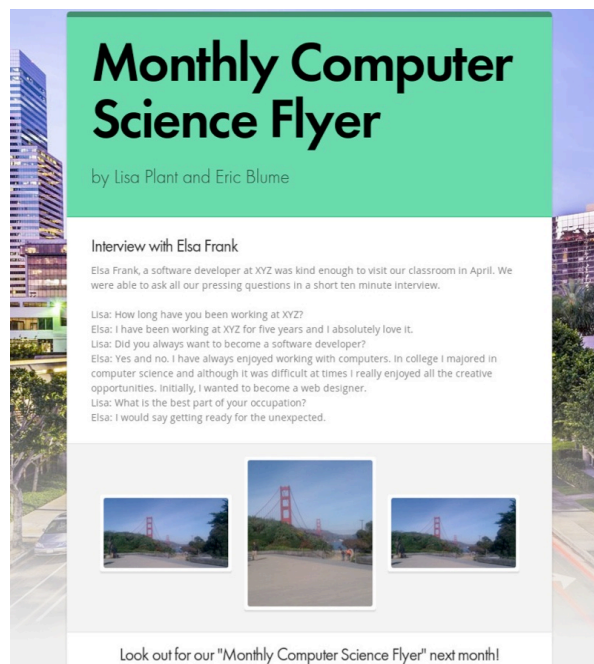
**Activity:** Educators utilize PowerPoint, Publisher, or Smore.com to create a flyer. The workshop leader demonstrates the steps instructors have to take to create a basic monthly virtual computer science flyer. Once teachers finish the flyer, they post it to their blog. Here are instructions for a PowerPoint flyer.

1. Educators select the PowerPoint icon.
2. Within PowerPoint, teachers select an appropriate template.
3. Instructors select images that are appropriate. Members go to “insert” and select “photo.”
4. In order to insert text, members go to “insert” and select “text box.”
5. Educators decide on further designs with their partners.

These are examples of self-created monthly computer science flyers.



Software: PowerPoint



Online tool: smore.com

It is important that educators consider family when encouraging female English language learners to enter computer science fields. Parent nights are a way to educate parents about the field of computer science. The monthly computer science flyer can be utilized as an introduction, as well as a presentation of students' work. This is a crucial time for the educator because he or she is able to learn about parents' perspectives and concerns. This is also an opportunity to learn about students' culture and linguistic

background.

Parents are able to share linguistic and cultural upbringings of the students. Therefore, a computer science parent night can be the foundation of varied sources of encouragement for female English language learners. Educators have to be prepared to involve all parents. This starts with an optional pre-parental night survey. Parents can answer all or choose what questions they would like to answer. Instructors utilize the survey to gather information about the students' parents in order to prepare for a successful computer science parent night. During the computer science parent night, educators share students' work in the field of computer science, share skills students have learned in the class, and encourage parents to share linguistic and cultural experiences. This information is then utilized to better understand students' needs and how to support female English language learners who are interested or show potential in the field of computer science.

Instructors are handed the example optional computer science parent night survey. In pairs, educators brainstorm additional questions that are relevant in helping female English language learners enter computer science fields. Pairs fill in questions thirteen till twenty. Afterwards, pairs are paired with another pair to create a group of four. Within these small groups, teachers exchange question ideas. In a whole member setting, volunteer teachers share their self-created questions with everyone, as well as discuss how the questionnaire can help in gaining insights about female English language learners' academic, linguistic, cultural, and computational needs.

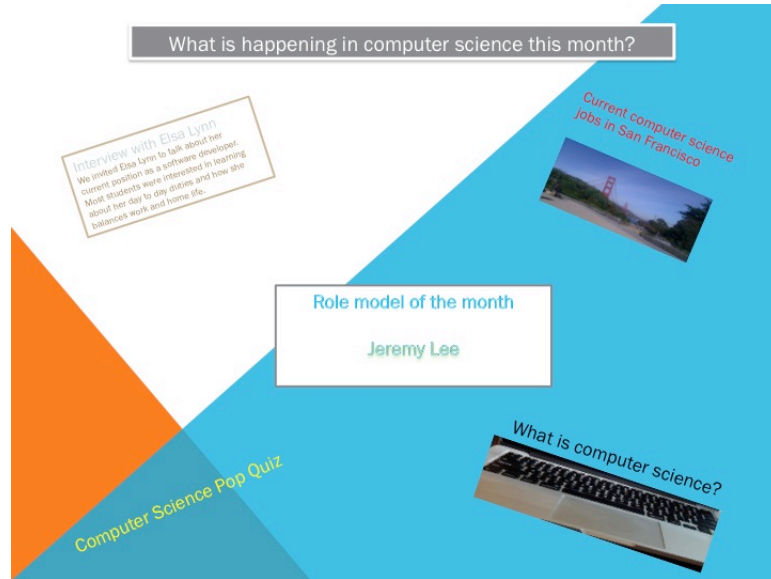
This is an example of a computer science parent night survey:

<b>Optional Computer Science Parent Night Survey</b>	
1. What are your availabilities during the week? (Ex: 6-9pm)	
2. What talents would you like to share with the school community? (Web design, public speaking, writing, etc.)	
3. What is your native language? (English, Spanish, French, German, etc.)	
4. Would you be interested in attending a computer science parent night?	
5. Are you able to check the class blog once a week?	
6. What is your occupation? (Teacher, engineer, artist, etc.)	
7. Would you be interested in appearing as a role model in our class?	
8. What language do you primarily speak with your child? (English, Spanish, etc.)	
9. Would you be able to attend a virtual parent conference?	
10. How often do you check your email?	
11. How often do you or your child use a computer at home?	
12. What would you like to share about your native language or culture? (Ex: Food, music, education system, etc.)	
13.	
14.	
15.	
16.	
17.	
18.	
19.	
20.	

Educators are shown the agenda of the potential computer science parent night. Teachers take the role of potential parents in this workshop and are encouraged to think about ways to integrate the concepts in their own educational institutions in order to better perceive female English language learners.

Instructors previously created a monthly computer science flyer. This flyer is also a valuable source for a computer science parent night. Educators can present the student created monthly flyer to parents and even ask for their input for subsequent flyers.

This is an example of a possible PowerPoint monthly computer science flyer:



The computer science flyer is monthly posted to the class blog and therefore virtually accessible to parents. In small groups of three, teachers discuss appropriate and relevant content for the class blog. Each group receives a brainstorming handout.

This is an example of a brainstorming handout:

Class Blog Ideas	
1.	_____
2.	_____
3.	_____
4.	_____
5.	_____
6.	_____
7.	_____
8.	_____
9.	_____
10.	_____
11.	_____
12.	_____
13.	_____
14.	_____

Educators invite role models to the computer science parent night to share their experience working in computer science fields. Role models can participate virtually or in person. During this workshop, teachers design questions that the role models would answer during the computer science parent night. It is best to invite more than one role model to represent the existing diversity within the field of computer science.

Independently, each instructor constructs ten questions that he or she believes are relevant in helping parents get a better understanding of the field of computer science.

This is an example of a possible role model questionnaire.

Questionnaire	
1.	How long have you been working in your current job?
2.	What do you like the most about your profession?
3.	How do you balance work and home life?
4.	What are the challenges in your occupation?
5.	Why would you recommend your field of study to other students?
6.	What was your major in college?
7.	If you could change one thing about your current job, what would it be and why?
8.	What is the ratio of man to woman in your occupation?
9.	What is one skill that a student should possess when entering your field?
10.	Why did you choose this field?

Parents also get the option to write down questions through the anonymous popcorn activity. Parents get a little slip of paper that allow them to write down questions for the role model. The teacher then collects the questions in a bowl, selects each at a time, and asks the role model one question at a time. During the workshop educators receive the anonymous slip of paper and write down three questions they would ask. The workshop leader collects the slips of paper and redistributes them to educators. This gives instructors a chance to share the questions another instructor wrote in the whole member setting. Every teacher gets a chance to share the three questions he or she selected.

This is an example of a slip of paper for potential questions:

Please write down one to three questions you would like to ask our guests.	
1.	_____
2.	_____
3.	_____

In a bowl, parents receive an array of language, culture, and gender role related questions. All parents sit in a tight circle and choose a slip with questions. After each parent answers his or her question, the questions are directed to the entire parental community to initiate a parental discussion. It is important that the questions help educators to better understand female English language learners' linguistic and cultural background to support them in ways that fosters success when pursuing computer science fields. Based on the parental population, questions are in English and other foreign languages, such as Spanish for example. Educators have to learn about parents' primary language through the optional computer science parent night survey or through other means. It is important that every parent is able to actively participate. During the workshop, educators also have to have available bilingual translators. These can come



from the school community, from friends, or other possible ways to create a welcoming ambience for all parents.

This is an example of possible language and culture questions in English:

What occupations have you discussed with your daughter(s) or your son(s)?	In your opinion, what jobs are best for family and work balance, and why?	If you could choose any language of instruction in schools, what language would it be and why?	What is the most important cultural event that you like to attend with your family?	How important are computer skills to you and your children?
In your opinion, what is expected of females in academia and in the professional world?	What are your favorite school events?	What is your opinion of social media as an additional instructional tool?	In your opinion, how old is too old for college or university?	Do you have any role models? If yes, can you please share the valuable characteristics of your role model?
If you could teach your daughter one thing, what would it be and why?	In your opinion, what are the most popular professions for females?	If you would have to choose one language that you had to speak, what language would it be and why?	In your opinion, what is one great way to relieve stress after a difficult day at school?	Can children be role models?
In your opinion, what are ways to gain wisdom or inspiration?	In your opinion, what are a few things that females have to consider when looking for a job?	In your opinion, what is more important for females, a flexible schedule or a steady income?	In your opinion, what are the best ways to find a suitable profession?	In your opinion, how many languages should a student be able to understand?

In groups of five, educators create twenty questions that are related to language, culture, and gender roles. The questions should help educators learn more about the perspectives of the parents of female English language learners, as well as give them insights into the linguistic and cultural needs of their students. Teachers think of their

parental populations within their educational institutions while writing questions. Once instructors are done, they cut single questions into squares and place it into the main bowl. When every group has written twenty questions and placed it into the bowl, a whole member discussion begins. Every instructor draws a question and gets a chance to answer it as well as initiate a whole member discussion. Once everyone has shared their answers and opinions, educators take a break before continuing to the reflection stage of the workshop.

This is an example of a blank language and culture question square.


Every teacher creates a blog post that discusses the advantages of the activity and how it could be adapted to their female English language learner population.

**BREAK:** Fifteen Minutes

### **Self- Evaluation**

**Purpose:** This is the assessment phase for educators. In this part, teachers get a chance to design a workshop for students that is catered toward female English language learners. It should demonstrate learned information of the workshop. In groups of three, instructors design a potential two-hour workshop for female English language learners. The workshop focuses on encouraging female English language learners to enter computer science fields. A short five to fifteen-minute PowerPoint presentation gives everyone a chance to understand what every small group produced. Instructors present their self-created workshop to everyone.

**Materials:** Internet, computers, chairs, tables, paper, pens, projector, projector screen, laptop, PowerPoint, and handouts. The materials are utilized to support educators in presenting their presentation, brainstorming ideas, and to prepare and write down their ideas. Every group utilizes the laptop, projector, and projector screen to present their self-created workshop to everyone. However, in groups, educators prepare their workshop at their own tables with the computers. Handouts can be virtually accessible to save paper.

**Period:** 11:25 AM – 11:45 AM

**Objective:** By the end of this period, educators will be able to create a two-hour computer science workshop catered toward female English language learners. The workshop will include basic html coding, one activity that considers students' native language and culture, as well as one innovative idea that was not covered in the workshop that educators believe would be valuable in encouraging female English language learners to enter computer science fields. Educators will also be able to evaluate their fellow instructors based on provided guidelines and method of delivery.

**Collaboration:** This part focuses on the people who are involved during the “self-

evaluation” phase. It involves the workshop leader and all members of the workshop.

**Grouping:** Educators work in groups of three. Instructors are encouraged to work with other workshop members that work in similar educational institutions.

**Process:** This portion lists the steps of the “self-evaluation” phase. First, educators receive flexible guidelines that help guide the overarching structure of the workshop. Teachers are asked to get in groups of three. Then, each small group creates a computer science workshop that is catered toward female English language learners. The intended workshop is presented in the form of a PowerPoint and evaluated by fellow instructors.

### Computer Science Workshop Guidelines

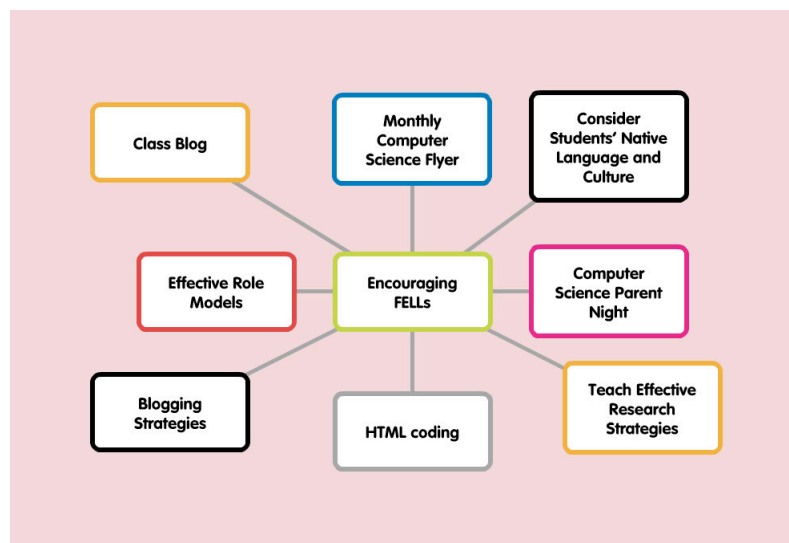
- I. What is the purpose of the workshop?
- II. How would you implement html coding?
- III. How would you utilize blogger as an instructional tool during your workshop?
- IV. Where would you recruit appropriate role models?
- V. How would you integrate students’ language and culture?
- VI. What resources will you utilize and what will it include? (Newspaper, flyer etc.)
- VII. How will you increase awareness of the workshop?
- VIII. How can you have students conduct research during the workshop?
- IX. How can you involve students’ parents?
- X. Who would be involved in the workshop? (Administrators, community members, etc.)

<b>Computer Science Peer Evaluation Form</b>	
<b>Name (Optional):</b> _____	
<b>Group (Circle):</b> 1   2   3   4   5	
<b>Directions for Evaluator:</b> Complete this peer evaluation after the presentation of your fellow instructors. Once you completed this form, hand your feedback to the group.	
<b>Directions for Presenter:</b> Upon review of your feedback, please hand this form to the workshop leader.	
1. The presenters clearly voiced the purpose of the workshop. (Circle)   Yes   No	
2. HTML coding exercises were included in the workshop. (Circle)   Yes   No	
3. The group utilized technology in their workshop. (Circle)   Yes   No	
4. Activities included role models for FELLs. (Circle)   Yes   No	
5. FELLs language and culture were considered within the workshop. (Circle)   Yes   No	
6. The group used relevant resources to deliver information to FELLs. (Circle)   Yes   No	
7. Strategies to attain workshop attendance were considered. (Circle)   Yes   No	
8. Research activities were included within the workshop. (Circle)   Yes   No	
9. FELLs families were contemplated within the workshop design. (Circle)   Yes   No	
10. The group considered the needs of their own educational institutions. (Circle)   Yes   No	
11. What innovative idea did the group include that was not covered in the workshop? _____	
12. What did you like the most about the workshop and why? _____	
13. Did you feel that every member of the group got an equal chance to demonstrate ideas and thoughts about the workshop? _____	
14. How would you rate this presentation? (Check) <input type="checkbox"/> Excellent <input type="checkbox"/> Good <input type="checkbox"/> Needs Improvement	
Add any additional comments here:	

### Independent Classroom Enactment

**Purpose:** Educators get a chance to brainstorm ways to encourage female English language learners in their own school communities to enter computer science fields. Instructors utilize popplet.com to create a graphic organizer with ideas. Workshop members then post it to their blog.

This is an example of a popplet.com graphic organizer.



**Materials:** Projector, projector screen, laptop, Internet, computers, chairs, and tables.

The materials are utilized to view how the workshop leader makes a graphic organizer.

Furthermore, instructors create their own individual graphic organizer at their computer stations.

**Period:** 11:45 AM – 12:15 PM

**Objective:** By the end of the period, educators will be able to create a graphic organizer with popplet.com. Teachers will brainstorm ideas to encourage female English language learners to enter computer science fields.

**Collaboration:** This part focuses on the people who are involved during the “independent classroom enactment” phase. Educators independently brainstorm how to implement novel ways to encourage female English language learners to enter computer science fields.

**Grouping:** Educators independently work on their graphic organizers.

**Process:** Instructors each sit on a computer and go to popplet.com. After watching the popplet.com tutorial, instructors create a graphic organizer that demonstrates novel ways to encourage female English language learners to enter computer science fields. Next, teachers post it to their blog. Finally, teachers volunteer to share their visuals and ideas with everyone.

### **Reflection**

**Purpose:** Educators get a chance to reflect on all of the gathered information and completed exercises. This time instructors express what they felt during the activities and how they believe the exercises could benefit female English language learners. Instead of posting it to the blog, workshop members are given a piece of paper or a small journal to keep. In it they write their first journal entry named “Workshop Reflection.” Teachers are encouraged to write anything that comes to mind for a total of thirty minutes. After thirty minutes, educators close their journals and take five minutes to digest their thoughts. Instructors are stimulated to continue reflecting on the journey of encouraging female English language learners who are interested or show potential to pursue computer science fields.

**Materials:** Pens, paper, chairs, and tables. The pens and paper are handed to educators for the first journal entry.

**Optional materials:** \$1 mini journals give educators a chance to complete their first

journal entry, as well as to continue writing reflections beyond the workshop.

**Period:** 12:15 – 12:45 AM

**Objective:** By the end of this period, educators will be able to reflect upon the workshop by writing a minimum of half a page in thirty minutes.

**Collaboration:** This part focuses on the people who are involved during the “reflection” phase. Educators primarily work independently and keep their reflections to themselves.

**Grouping:** Educators work independently on their reflective journal entry.

**Process:** Instructors receive a piece of paper or a mini journal from the workshop leader and a pen to write down their reflective thoughts. The first journal entry is called “workshop reflections.” Finally, teachers are encouraged to continue reflecting upon the journey of encouraging female English language learners to enter computer science fields.



**Overall Workshop Evaluation** (Can also be accessed at [surveymonkey.com](https://www.surveymonkey.com))

Date: \_\_\_\_\_

Name of the Workshop: \_\_\_\_\_

Level of Experience in Current Occupation: \_\_\_\_\_

Name of the Workshop Leader: \_\_\_\_\_

**Directions:** Please answer all questions to the best of your ability. The information is solely utilized for the purpose of improving subsequent workshops. Thank you.

1. Did the workshop leader meet the discussed objectives? (Circle) Yes No
2. The workshop met or exceeded my expectations. (Circle) Yes No
3. The content of the workshop is relevant to my student population. (Circle) Yes No
4. The workshop was organized and interesting. (Circle) Yes No
5. The workshop leader was professional and equipped. (Circle) Yes No
6. I received enough feedback during and after activities. (Circle) Yes No
7. What would you change about the workshop?

---

8. What parts of the workshop were the most relevant to you and why?

---

9. What parts of the workshop were the least relevant to you and why?

---

10. What parts of the workshop need improvement?

---

11. Would you recommend this workshop to other educators? Why or why not?

---

12. How would you rate this workshop? (Check)  Excellent  Good  Poor

---

13. Please add any other suggestions that you would like to share below.

---

\*This is the final workshop evaluation form that educators complete after the workshop.