1-1-2010

A Q-methodology study of adult English language learners' perceptions of audience response systems (clickers) as communication aides

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2010

Abstract

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by

Lisa Ann Rodriguez

M.S., Western Oregon University, 2004

B.A., California State University, Northridge, 1987

Dissertation Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Philosophy

Education

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August 2010

Abstract

This study explored the perceptions of adult English language learners about the use of audience response systems (clickers) to facilitate communication in a classroom environment. In the early stages of second language acquisition, learners' receptive capabilities surpass expressive capabilities, often rendering them silent in their second language. Educational strategies and tools may be available to help English language learners communicate more effectively by enabling them to demonstrate their knowledge and express their opinions nonverbally. Many studies have been conducted with clickers, but none were found pertaining to adult English language learners. Second language acquisition theory provided the theoretical base for this research. In this Q-methodological study, adult English language learners enrolled in a computer skills course ranked statements about using clickers according to how closely they align with their personal perceptions. Factor analysis was performed to identify commonalities and patterns in perceptions. The findings support the view that second language acquisition theory influences how technology tools are perceived by English language learners. Adults with lower English language proficiency levels perceived the anonymity provided by clickers to be beneficial. Participants with beginning to intermediate levels of English proficiency perceived the clickers to be more valuable for communication than did those with lower levels of English proficiency. Results of this study may affect positive social change by leading to more effective instructional and assessment practices for adult English language learners and by fostering research into the viability of educational technology communication tools with all English language learners.

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Dedication

To my husband, Bruce Rodriguez, my soul mate, best friend, and partner on this great roller coaster ride.

Acknowledgments

I'm on Aslan's side even if there isn't any Aslan to lead it. I'm going to live as like a Narnian as I can even if there isn't any Narnia.
-C.S. Lewis *(The Silver Chair)*

Thank you, Bruceypuba. From the first time our eyes met across my mother's pool, to the second time they met twelve years later across a crowded room at a superbowl party where you sang, hit my nose with a volleyball, talked with me till two at Denny's, and stole my heart...we have always been each others'. Your songs speak to my heart, your voice gives me Brucebumps, your eyes captivate me, you inspire and encourage me, and you have made me smile and laugh every single day for over 25 years. I also know it's true…you are the one I will spend my life with because no one else could tolerate me!

Thank you, David and Daniel for your patience when I spent more time with my computer than with you. Boys, I always loved you best! Thank you for your love, acceptance, and encouragement. You are my heart, and the best thing in life I ever did or ever will do is be your mom.

Mom, thank you for being my mother, friend, and inspiration. You taught me to be determined, strong, and independent. You taught me to say what I think, even if it gets me into trouble! The songs you wrote and sang for Linda and me, the Treasury of the Familiar and the Littlest Angel are all part of the theme song that plays to my life. Whatever you and I decide to accomplish, we do it. We never give up. It's because of this strength you instilled in me that I knew I'd accomplish this goal.

Raul, thank you for your help with this project…but thank you even more for your friendship, and for teaching me humility, patience, and self-control. You will always be older and wiser than me, Maestro.

Thank you, Michelle, for letting me borrow your nice new clickers.

Guillermo, Elizabeth, and Mariano, thank you for your help with translations and for not making fun of my Spanish.

Thank you Mateo and Sonia for allowing me to conduct my research study in the Family University and helping me to coordinate and implement the study.

Thank you, Liset, for reading and evaluating the Q-set statements to ensure their validity for this group of participants.

Mark, John, and Neil, thank you for making sure the things I needed were installed and getting the glitches out.

Irene, thank you for encouraging me. When I wasn't sure if I should take on this challenge, you said the right things to give me the faith and determination to do it.

Thank you, Jenny and Todd, for supporting me as a technology teacher and doctoral student by being flexible, allowing me to attend conferences and technology workshops, and supporting my efforts to help our students to develop 21st century multilingual and technological skills.

Thank you Heidi, Erika, Maggie, and Susan for your friendship, encouragement, and moral support.

Thank you, my Papafritos, for being my educational technology guinea pigs and for making my job so fun and fulfilling. You are the future and I know you will make our world a better place. I'm proud of you and I love you, my technology polyglots!

Thank you, Cheri, my first mentor. My scholarly writing and research skills improved because of your guidance and instruction.

Thank you, Jose, my methodologist. Numbers are hard for me. You helped me to understand Q-methodology and to see how data analysis can show you things that words may not reveal. You also inspired me, from the first time I met you as my milestone three professor at the residency in Portland, because you made me see that I could be a professor without losing poetry and passion.

Last, but surely not least, thank you, MaryFriend. I can't adequately express in words the extent of my appreciation. From the first time you talked to me about my first KAM, you cut a path through the overgrown jungle in my head, and you prevented me from getting overwhelmed. When I was doubtful and worried that I would make it, you gave me instant confidence. You have inspired me so much and shown me that it's possible to balance being a professor with being a loving and devoted mother. You are my role model, and God blessed me so much with you. Thank you.

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Chapter 1: Introduction to the Study

The demographics of the United States have changed significantly in the past 20 years, and they continue to change with continued immigration of people from diverse and distant locations around the world (Goldenberg, 2008). Chen, Kyle, and McIntyre (2008) indicated that by the year 2030, K-12 students enrolled in American schools are projected to be 40% English language learners. The Center for Applied Linguistics reported that 46% of adult education students in the United States are enrolled in English as Second Language courses (CAELA, 2010). These statistics demonstrate the importance of developing effective and accessible educational programs to serve English language learners because, as Goldenberg commented, English language learners' lack of academic and professional skills "bode ill for society as a whole, since the costs of large-scale underachievement are very high" (p. 11).

Technology Use with English Language Learners

As in other sectors of society, education, and business, the use of technology has become increasingly common in adult education programs (Coryell & Chlup, 2007); but, selecting the most effective and appropriate technology tools is complicated because such a variety of hardware and programs exist. A critical issue in selecting technology tools is that the task of acquiring a second language should not made more difficult by using unnecessary and complicated tools. Consideration of second language acquisition theory as the foundational framework for the use of technology with second language learners may help to ensure that pedagogy takes precedence over the tools used for instruction.

The use of technology may serve two functions in the instruction of adult English language learners: appropriate tools may facilitate second language acquisition, and current technology skills and knowledge may contribute to adult English language learners' academic and professional opportunities (Ibarz & Webb, 2007). Many research studies have been conducted on the use of technology in the instruction of English language learners (Coryell & Chlup, 2007; Christensen, Merrill, & Yanchar, 2007; Dooley, 2009; Foulger & Jimenez-Silva, 2007; Ibarz & Webb, 2007; Narciss & Koerndle, 2008; O'Hara & Pritchard, 2008; Pastor, 2007; Poulsen, Hastings, & Allbriton, 2007; Prinsen, Volman, & Terwell, 2007; Sahin, 2009; Ware, 2008; Warschauer, 2008; & Yang, 2007). However, a technology tool that may hold promise to enhance instruction of adult English language learners that has not been studied with this population is audience response systems, also referred to as clickers.

In addition to the rapidly increasing numbers of English language learning K-12 students in the United States, Mathews-Aydinli (2008) reported that English language learners compose "the fastest growing segment of learners in adult education programs" (p. 198). She contended that adult English language learners' educational needs are not being adequately met, as evidenced by high dropout rates from adult education programs and low levels of achievement (Mathews-Aydinli, 2008, p. 199). Mathews-Aydinli stressed that there is a critical lack research on adult English language learners (p. 210). She suggested that research be done to study instructional practices with adult English language learners that could "actually--and measurably--be shown to raise communicative competence" (p. 211).

Adult English language learners were said to be motivated to learn English because of their awareness of English fluency "in order to function socially" (Dewaele & Thirtle, 2009, p. 644); however, they were also described as being more anxious than younger learners because of worry about "making mistakes, losing face, criticism, negative evaluation, and judgmental remarks" (Pichette, 2009, p. 77). Noormohamadi (2009) concurred, explaining, "Adults especially can experience apprehension because they cannot present themselves in the new language as they can in their native language" (p. 41).

Relevant, task-based learning experiences were advocated for English language instruction of adult English language learners to increase interest and motivation, and to build schema about the English content (Ibarz & Webb, 2007; Lambert, 2008; Mathews-Aydinli, 2008; McKay & Schaetzel, 2008). While adult education programs for English language learners were referred to as inadequate, the need to improve language and vocational skills of this population was described as critical for the sake of "economic stability" (Mathews-Aydinli, 2008, p. 199). Many adult English language learners were reported to express a desire to return to the profession they left behind in their native country, but often find themselves limited to menial jobs with low pay because of their lack of English language fluency in their professional field (Lambert, 2008). Wrigley, Chen, White, & Soroui (2009) advocated for educational programs that specifically respond to the needs of adult English language learners in order to "capitalize on the experience and expertise of immigrants would mean not only an investment in new Americans but could also serve to strengthen communities and the nation as a whole" (p.

23). Technology skills were identified as critical for professional success in the 21st century, and adult English language learners expressed satisfaction about developing their English language skills and computer skills at the same time, (Ibarz & Webb, 2007, p. 219).

Particular factors may influence use of technology with adult English language learners compared with its use with K-12 English language learning students. Increased student age was correlated with increased language anxiety and decreased levels of motivation (Bernaus, Moore, & Cordeiro, 2007; Wray & Fitzpatrick, 2010). Coryell and Chlup (2007) explained that older students may be resistant to using technology, but that eventual buy-in was shown to "help them overcome learning/acquisition barriers (and) reduced the generation gap" (p. 270). This may be especially important in the case of adult English language learners because development of their own technology knowledge and skills may help them provide guidance to their children in an increasingly global and technological world.

It was emphasized that care must be taken not to overwhelm or confuse adult English language learners with overly complex technology tools and tasks (Coryell & Chlup, 2007). Before an instructor utilizes technology for instructional purposes, users must first be comfortable using the technology:

For the computer inexperienced and often fearful adult learners, teachers would use hand-over-hand methods with the mouse, alternative, shorter tasks were provided, success was facilitated at every opportunity, and printed tasks were assigned, so students could have physical proof of accomplishment. According to Coryell and Chlup (2007),

one instructor emphasized the importance of having tangible evidence of success so the students could bring home their work to their families and friends. Allowing students enough time and patience to complete tasks and assignments was also key to keeping reluctant computer users engaged (Coryell & Chlup, 2007, p. 270).

Clarity and conciseness of directed instructions, active learning opportunities, and collaborative learning environments may help achieve a balance between English language acquisition and the development of relevant 21st century skills. Feedback was identified as a critical component in the instruction of adult English language learners through a variety of means, such as individual conferences and "anonymous student response forms" (Coryell & Chlup, 2007, p. 273). In addition, classroom activities that are repetitive and restricted can help students feel comfortable and less inhibited when speaking aloud in their second language (Gibson, 2008). Technology tools may facilitate the creation of these kinds of learning opportunities, especially in technology skills classes taught in English. One such tool that can be used for anonymous student responses and to provide controlled, imitative activities is the audience response system.

Audience Response Systems

Audience response systems may facilitate communication for English language learners and enable them to demonstrate knowledge and express their opinions because it allows them to do so nonverbally. These tools consist of separate remote control units for each participant, using either radio frequency or infrared technology, and software residing on the facilitator's computer (Edmonds & Edmonds, 2008). Audience response systems have been used for many years in colleges and university classrooms, business

meetings and employee trainings, and in government environments such as elections (Lowery, 2005). In an academic environment, instructors can create their own questions for students to respond to, or purchase commercially made quizzes. Audience response systems can be used for formative assessment by checking students' comprehension of content during instruction, conduct summative assessments for grading at the end of units, to take polls, or to conduct elections.

Although studies of audience response systems with English-speaking students have demonstrated that this tool may increase students' motivation and participation levels (Blood & Neel, 2008; Edmonds & Edmonds, 2008; Trees & Jackson, 2007), their effectiveness in facilitating communication for English language learners has not been explored. The nonverbal, anonymous feature inherent in the use of audience response systems may facilitate communication for many people who are hesitant or anxious about speaking in public, and it may be especially helpful for English language learners.

Research on audience response systems with adult English language learners is warranted to determine if they may have the potential to enhance instruction and empower them by providing a means of nonverbal self-expression. These adult learners may be even more hesitant than their children are to speak aloud in English because of heightened feelings of self-consciousness that may be associated with adult cognition (Krashen, 1981, p. 76). Many parents of English language learning K-12 students enroll in English as Second Language classes and other courses conducted in English that may be offered free of charge by school districts. These parents may benefit from the use of nonverbal response tools to facilitate their learning and self-expression in these courses.

Background of the Study

Second language acquisition researchers demonstrated that learners pass through a silent phase in which their receptive abilities surpass their expressive abilities (Krashen, 1985). People may understand spoken English and have ideas, attitudes, and opinions about the content presented in English, but are unable or unwilling to respond verbally in English. They may lack the English language proficiency to express themselves verbally, or they may be hesitant to speak because of anxiety and lack of confidence in their English speaking ability (Krashen, 1985). Even after acquiring beginning proficiency levels, English language learners may not express themselves verbally because of insecurities about pronunciation, grammar, or lack of vocabulary (Krashen, 1985).

While only 17.9% of the United States population and 14% of the population in the State of Oregon were identified as speakers of languages other than English, 23% of the population of Marion County, Oregon was identified as speakers of languages other than English (U.S. Census Bureau, 2008). Of those people classified as speakers of languages other than English, 18.8% of them are Spanish speakers. More significantly, while 10.3% of K-12 students in the state of Oregon were designated as English as Second Language students, 64.1% of students enrolled in the district in which this study took place were designated as English as Second Language students (Oregon Department of Education, 2010). The high number of English language learners in this geographical area in comparison with state and national statistics makes this study especially relevant and possible implications more significant than if the study was conducted in an area with fewer English language learners in the population.

Problem Statement

This Q-methodology study addressed a gap in the literature by exploring the perceptions of adult English language learners about audience response systems as tools to facilitate communication in English, to facilitate English language acquisition, and to facilitate learning technology skills and knowledge in an English-speaking classroom environment. Although many studies have been conducted with audience response systems to examine their effects on student motivation, participation levels, and their positive correlation with higher academic achievement (Edmonds & Edmonds, 2008; Mohr & Mohr, 2007; Thoms & Williams, 2008; Trees & Jackson, 2007; Yoon, 2007), none have been located that pertain specifically to English language learners. In addition, no studies were found that explore the use of audience response systems with English language learners enrolled in adult education courses. Finally, although the silent phase has been discussed at length in regard to second language acquisition (Krashen, 1985), no studies were found that revealed the specific thoughts and emotions of English language learners as they acquire a new language.

Chapter 2 includes a discussion of the increasing number of English language learners in the United States and in the American school systems, and specifically English language learning adults enrolled in adult education courses. In addition, the use of audience response systems was discussed in more detail, the tenets of second language acquisition theory were explained, and educational methods and practices with adult English language learners were explored. Chapter 2 provides rationale for why the use of

audience response systems may be advocated with English language learners in an educational environment.

Purpose of the Study

The purpose of this study was to investigate perceptions of adult English language learners about audience response systems (clickers) as tools to facilitate communication, learning basic technology content, and language acquisition in a predominantly English-speaking classroom environment in comparison with other forms of verbal and nonverbal response.

Conceptual Framework

Krashen (1981, 1985) explained that second language learners pass through a silent period in which receptive language abilities surpass expressive language abilities. Second language learners are capable of understanding content they hear in their second language more than they can verbalize in that language during this stage of language acquisition. He also postulated the concept of the *affective filter*, a psychological state of anxiety or embarrassment experienced by second language learners when they must express themselves verbally in their non-native language, even when they have progressed to beginning or intermediate levels of proficiency (Krashen, 1981). During the silent period, or because of the affective filter at beginning or intermediate levels of proficiency, second language learners may be unable or unwilling to demonstrate knowledge, understanding, ideas, or opinions in their nonnative language.

English speaking instructors may be unable to assess effectively their English language learning students' understanding of instructional content and may be unaware

of these students' opinions and ideas because of the language barrier. This hinders teachers' ability to conduct formative assessments during instruction so that they can identify content areas that require review or content mastery that indicates students' readiness to progress to more complex content.

The discrepancy between expressive and receptive language acquisition may contribute to the condition of hegemony in American society, a condition in which certain groups of people are oppressed because of socioeconomic, culture, race, or language differences from the dominant culture (Freire, 1970, 1985; Giroux, 1988). Freire (1970) emphasized the importance of discourse and communication to counteract the forces of hegemony. A means of facilitating and promoting communication and self-expression by oppressed groups of people is a critical need for positive social change.

The constructs for this Q-methodology research study, grounded in second language acquisition theory, included how English language learners perceive audience response systems to facilitate communication in English, how they affect motivation and comfort levels in an English-speaking classroom environment, how they affect perceived English language acquisition, and how they affect perceived learning of technology content.

Nature of the Study

Q-methodology was used in this study because the objective of the study was to assess the perceptions and opinions of English language learners about the use of audience response systems to facilitate communication in English. Q-methodology is appropriate for this study because this methodology is designed to measure operant

subjectivity, "an in-depth portrait of the typologies of perspectives that prevail in a given situation among individuals" (Quiles, 2009, p. 2). Q-methodology studies explore perceptions and attitudes (McKeown & Thomas, 1988; Quiles, 2009) and search for correlations between people. Q-methodology has a unique design that allows objective, quantitative analysis of subjective, qualitative data. In addition, Q-methodology enables the researcher to gain meaningful data and draw conclusions with a small sample size (McKeown & Thomas, 1988). Quiles stated that samples in studies employing Q-methodology are carefully selected rather than randomized, so that variability in a specific case or situation can be analyzed (p. 2).

Although quantitative in nature, Q-methodology measures traditionally qualitative data such as perceptions and attitudes. A concourse of statements is developed by reviewing relevant literature on second language acquisition and the use of audience response systems. According to Fisher's probabilistic concept of experimental design (as cited in Preece, 1990) emphasizing variance analysis (Brown, 1992) a relevant Q-sample of statements are chosen out of the concourse that are representative of the full range of perceptions expected in regard to the research questions. Participants sorted these statements according to how little or how much they agreed with them, following written conditions of instruction that were provided to them in English and in Spanish. A factor analysis was conducted to evaluate the data received in this Q-sorting activity. This study may help to determine whether audience response systems should be advocated for use in adult education classes with English language learners.

The Family University Program (FAMU) is part of the Migrant/Title I-C program of a school district with a disproportionately large English language learner population, 64.1% of K-12 students compared with the national average of 17.9% and 14% of the population of Oregon (Oregon Department of Education, 2010). The Family University offers classes in English, technology, and courses toward earning General Educational Development (GED) certificates. The courses are offered in the evenings, four days a week, from 6:15 pm until 9:15 pm in the Academy of International Studies campus of the larger high school campus, and taught by the local community college and public school district staff. The Family University supports the school district's commitment to building family and community partnerships and supporting two of the district's core values: the importance of family as the strongest influence on growth and development, and the importance of interdependence of all members of a community.

Research Questions

The following research questions are explored in this Q-methodological study:

1. What are English language learners' perceptions of audience response systems as tools to facilitate communication in a predominantly English-speaking classroom environment?
2. What are English language learners' perceptions of audience response systems as tools to facilitate English language acquisition and learning technology skills content?
3. What are English language learners' perceptions of audience response systems in comparison with other forms of verbal and nonverbal response?

Operational Definitions

The following terms and abbreviations may be perceived as professional jargon and are operationally defined in order to clarify their meanings.

Affective Filter: Krashen (1981) described the affective filter as a state of anxiety or embarrassment often experienced by second language learners when they attempt to speak in their second language.

Audience response systems (Clickers): These technology systems consist of separate remote control units for each participant, one receiver unit using either radio frequency or infrared technology, and software residing in the instructor's computer (University of Wisconsin, 2009).

Antidialogics: This sociological phenomenon is characterized by a group of people stifling another group's ability to express themselves or question their conditions (Freire, 1970).

Comprehensible Input: Verbal input in a second language is made understandable to the learner through visual or other means (Krashen, 1981).

English Language Learners (ELLs): Students with limited English language proficiency are identified as English Language Learners (Bank Street College of Education, 2009).

Hegemony: Freire (1971) defined hegemony as oppression and influence of one group over another.

Second Language Acquisition Theory: This theory explains how learners acquire second and subsequent languages and the teaching strategies that best meet these learners' needs (Krashen, 1970).

Silent Period: The silent period is a period of time in which second language learners' receptive abilities surpass their expressive abilities. People may understand spoken English and have ideas, attitudes, and opinions about the content presented in English, but are unable or unwilling to respond verbally in English (Krashen, 1985).

Assumptions

It was assumed that all participants had at least beginning levels of English language proficiency and were able to comprehend the content provided verbally in English so that they could respond to it with the audience response systems. Although the researcher assumed that participants had not used audience response systems, and may never have heard of them, their experience with other more common technologies such as cell phones was expected to facilitate their introduction and use. Participants were enrolled in an adult education program, so it was assumed that all or most participants had at least basic understanding of the educational system, and at least minimal experience in a classroom environment. It was assumed that a Q-methodological approach would effectively reveal the perceptions of participants about the use of audience response systems, and that analysis of the data would reveal significant factors and patterns.

Delimitations

The participants for this study were recruited from an adult education basic technology course offered to adult English language learners in a central Oregon school district in the "urban fringe of a mid-size city" (Schooltree, 2008, p. 1). The sample size for this study was expected to be approximately 15-20 participants. Small sample sizes are considered typical for Q-methodological studies (McKeown & Thomas, 1988). The subjective data gathered from a Q-methodological study were expected to compensate for the limited generalizability possible from such a small sample size by providing in-depth insights and details about participants' thoughts and opinions. This sample was chosen because, as parents of students in the school district, participants were stakeholders, making their responses relevant to instructional practices and possible implications of this study to the district and the Family University program.

Scope of the Study

This study was conducted from April through June 2010 from 6:30 pm to 9:15 pm. The study was conducted in conjunction with a basic technology course taught within the school district's Family University program, and took place in the computer lab in one of the district's four high schools. Participants were adults that had enrolled in one or more Family University courses. All participants had access to a computer and Internet connectivity while in class, and they were invited to use the computers with Internet access that are offered for free use in the district's local community college outreach locations. Participants learned basic computer operation and terminology, Windows organization, Microsoft Word basic skills, Internet safe and responsible use,

Internet searching, email and other social networking skills, and basic skills involving other technologies such as cell phones and mp3 players. Participants were also instructed on how to use the audience response systems to answer questions or express opinions nonverbally.

Limitations

Goldenberg (2008) stated that the number of English language learners in K-12 schools is 9 million students. Chen, Kyle, and McIntyre (2008) indicated that by the year 2030, K-12 students enrolled in American schools are projected to be 40% English language learners. This study cannot be generalized for the entire population of non-English speaking parents of K-12 students in the United States because only a limited number of parents participated. Generalizability is further limited by including only parents enrolled in adult education courses, because many adult English language learners may not have any experience in the American educational system or with technology, and many may not have the beginning levels of English language proficiency necessary for participation in this study. However, this study provides valuable insights about the perceptions of adult English language learners about audience response systems and about participation in English-speaking classroom environments. Although transferability to the larger population is limited, this study provides the foundation for further research, leading to greater generalizability and possible implications that lead to enhanced education for second language learners and more egalitarian school systems.

Significance of the Study

Freire (1970) defined oppression as a group of people stifling another group's ability to express themselves or question their conditions, also referred to as antidialogics. He contended that, as the voices of the oppressed are kept silent, apathy develops, and people accept the status quo (p.138). Audience response systems may provide the means for previously stifled voices to be heard by enabling English language learners to express themselves nonverbally. While several researchers explored the use of audience response systems with students and demonstrated their effectiveness as instructional tools that increase participation and motivation levels (Barnes, 2008; Cunningham, 2008; Keller, Finkelstein, Perkins, Pollock, Turpen, & Dubson, 2007; Lincoln, 2008; Mula & Kavanagh, 2009; Premkumar & Coupal, 2008; Trees & Jackson, 2007), none offered insights about the perceptions of second language learners about this tool's ability to facilitate communication between instructors and learners.

This study was designed to enlighten school personnel about a technology tool that may contribute to positive social change by empowering English language learners. Additionally, this study provides a foundation for further research with second language learners. The results of this study suggest further research to explore their use with K-12 second language learning students to determine if they have the potential to enhance instruction and facilitate these students' demonstration of their knowledge, understanding, and opinions. This study was intended to effect positive social change by contributing to more pluralistic, egalitarian educational environments in which all participants have an equal voice.

This study was expected to fill a gap in the research relating to adult English language learners (Mathews-Aydinli, 2008) and the use of audience response systems to facilitate their communication in an English-speaking classroom environment. This contribution to the literature on adult education programs for adult English language learners may lead to instructional methods and environments that better meet their needs, possibly resulting in increased enrollments and lower dropout rates.

Summary

Previous studies involving the use of student response system technology has been limited to native-English speaking students. The purpose of this study was to investigate perceptions of adult English language learners about audience response systems to facilitate communication in an English-speaking learning environment. This study addresses the lack of research involving audience response systems with adult English language learners.

Brown (1997) contended that a small sample size, relative to typical experimental designs, is "adequate for demonstrating the principles involved in the application of Q methodology" (p. 5) to achieve an adequate representation of a variety of subjective viewpoints. Instead of employing the traditional methods of studying many participants in order to correlate tests, Q-methodology is used with a small number of participants to find correlations between people by giving them a large number of test items in the form of a Q-sort (De Graaf & Van Excel, 2005; Quiles, 2009). This Q-methodological study involved a sample size of 10 to 20 adult English language learners enrolled in a basic technology skills course in an adult education program called the Family University that

serves the parents of K-12 students in a school district in central Oregon. By examining the perceptions of adult English language learners about the effectiveness of audience response systems to facilitate communication in a predominantly English-speaking environment, conditions of hegemony were challenged by giving traditionally unrepresented populations the chance to express their opinions and participate in an activity that may lead to positive social change in educational systems.

Chapter 2 of this proposal reviews and analyzes current research in the area of second language acquisition, audience response systems, and the use of technology with English language learners. This literature review also evaluates current studies utilizing Q-methodology and the specific methods used in these studies were compared and contrasted with the methods proposed for this study. Chapter 3 describes Q-methodology in detail, and explained how it was expected to provide insights into the perceptions of English language learners about audience response systems and other forms of nonverbal response tools to facilitate communication in an English-speaking environment. Chapter 4 presents the results of this study, and chapter 5 discusses the implications and conclusions of the study.

Chapter 2: Review of the Literature

A large segment of the American population is identified as nonnative English speaking, and this population is continuing to grow (Goldenberg, 2008). While 40% of all K-12 students are expected to be identified as English language learners by the year 2030 (Chen et al, 2008), English language learners are already projected to comprise 46% of adult education students according to the Center for Applied Linguistics (2010). Adult English language learners face particular challenges. They may be more self-conscious about their lack of English proficiency than children, they may find it more difficult to learn a second language when they begin learning it after adolescence, they may have fewer opportunities than children to receive English instruction, and they may have family and work obligations that make it difficult for them to attend courses when they are offered. However, acquiring English proficiency and developing current technology skills and knowledge may be critical for adult English language learners' professional and economic success, as well as their ability to help their children with schoolwork and provide guidance in an increasingly technological world.

English language learners are defined as students enrolled in American schools that are not native English speakers (National Center for Educational Statistics, 2009). Second language acquisition theory provides a framework for designing and providing effective educational experiences to English language learners, emphasizing the need to provide Comprehensible Input that enables learners to scaffold learning new content and minimization of the Affective Filter, a state of anxiety that hinders learning (Krashen, 1985). Technology tools have been used for many years in the instruction of English

language learners (Coryell & Chlup, 2007; Christensen, Merrill, & Yanchar, 2007; Dooley, 2009; Foulger & Jimenez-Silva, 2007; Ibarz & Webb, 2007; Narciss & Koerndle, 2008; O'Hara & Pritchard, 2008; Pastor, 2007; Poulsen, Hastings, & Allbriton, 2007; Prinsen, Volman, & Terwell, 2007; Sahin, 2009; Ware, 2008; Warschauer, 2008; Yang, 2007). Many technologies lend themselves to the goal of second language acquisition theory because they have the potential to make input more comprehensible for English learners through visual and auditory cognitive channels and interactive learning activities. New technologies continue to be developed and introduced in educational settings, and some of these technologies may have the potential to enhance the instruction of English language learners. However, it is contended that pedagogy must be the priority when selecting tools for education, and care must be taken not to adopt tools that may be detrimental to learning (Skinner, 2009).

Audience response systems, also known as clickers, have been studied in many educational, business, and government environments as tools that enable users to respond to questions nonverbally. Studies on audience response systems focus on various factors including levels of student engagement (Carnaghan & Webb, 2007; Cotner, Fall, Wick, & Walker, 2008; Premkumar & Coupal, 2008), participation levels (Gentry, 2009; Hoekstra, 2008; Lucas, 2009; Mula & Kavanagh, 2009; O'Hanlon, 2007; Stowell & Nelson, 2007), perceptions of students about clicker use (MacGeorge, Homan, Dunning, Elmore, Bodie, Evans, Khichadia, Lichti, Feng, & Geddes, 2008; Patry, 2009; Trees & Jackson, 2007; Walker & Barwell, 2009), pedagogical issues (Koenig, 2010; Morgan, 2008; Penuel, Boscardin, Masyn, & Crawford, 2007; Salend, 2009) question design

(Skinner, 2009; Sullivan, 2009), and effects on (Beuckman, Rebello, & Zollman, 2007; Cunningham, 2008; Morling, McAuliffe, Cohen, & DiLorenzo, 2008; Thoms, & Williams, 2008; Yourstone , Kraye, & Albaum, 2008;). Research has been done on other forms of response systems such as response cards cards (Clayton & Woodard, 2007; Musti-Rao, Kroeger, & Schumacher-Dyke, 2008; Randolph, 2007; Wood, Mabry, Kretlow, Lo, & Galloway, 2009) and verbal response protocol (Mohr & Mohr, 2007), that support the pedagogical conviction that active participation in a variety of forms is beneficial for heightened levels of student engagement and increased learning.

This study addressed the gap in the research by exploring the use of audience response systems with adult English language learners enrolled in a basic technology course offered through their children's school district. In addition to exploring the uses and effects of audience response systems, this literature review provides background on English language learners in the American school system. Particular attention was given to assessment of English language learners and how reliable and valid assessments can be designed and conducted in order to evaluate the effectiveness of various instructional approaches and application to future real world experiences. An explanation of second language acquisition theory was provided, indicating how it has guided the instruction of English language learners. In order to provide a better understanding of the participants in this study, focus was directed at educational programs designed for adult English language learners. The review describes the use of technology tools with English language learners and concludes with a discussion of student response systems, also known as clickers, in a variety of educational environments.

The focus of this study was on the use of technology in the instruction of English language learners and, specifically, their perceptions about audience response systems and other forms of nonverbal response tools to facilitate communication in an English-speaking classroom environment. The study was guided by the following research questions:

1. What are English language learners' perceptions of audience response systems as tools to facilitate communication in a predominantly English-speaking classroom environment?
2. What are English language learners' perceptions of audience response systems as tools to facilitate English language acquisition and learning technology skills content?
3. What are English language learners' perceptions of audience response systems in comparison with other forms of verbal and nonverbal response?

This literature review was created by reviewing and evaluating material from peer-reviewed journal articles, scholarly books, and online documents. Information about adult English language learners and educational programs that serve them was collected from several print and online sources, including journals dedicated to adult education programs and organizations such as Teachers of English as a Second or Other Language (TESOL). Electronic databases including Education Research Complete, Educational Resources Information Center, Teacher Reference Center, and Academic Search Premier were accessed and searched for the most current and pertinent research using the following key terms: *second language acquisition, English language learners*

in the United States, adult English language learners, the use of technology in the instruction of English language learners, audience response systems (clickers), and other *forms of verbal and nonverbal response in a classroom environment*. The organization of the literature review is as follows: (a) English language learners in the United States (b) second language acquisition theory, (c) educational programs for English language learning adults, (d) the use of technology in the instruction of second language learners, (f) nonverbal response, and (g) audience response systems.

A Gap in the Research on Audience Response Systems

Although only one research study was located that examined audience response system technology with English language learners, several studies demonstrated the tools' apparent effectiveness in raising students' motivation and engagement levels, increasing participation, and correlating positively with higher academic achievement and engagement (Carnaghan & Webb, 2007; Cotner, Fall, Wick, & Walker, 2008; Gentry, 2009; Hoekstra, 2008; Lucas, 2009; Mula & Kavanagh, 2009; O'Hanlon, 2007; Premkumar & Coupal, 2008; Stowell & Nelson, 2007; Walker & Wick, 2008). With a conceptual framework of second language acquisition theory, it is suggested that the inherent features of audience response system technology is well suited for the instruction of English language learners. It enables learners to respond nonverbally by pushing a button, and it allows for anonymity that may lower the affective filter (Krashen, 1981).

The only study located that examined the use of student response systems with English language learners involved deaf and hard of hearing university students who use sign language as a native language enrolled in beginning and intermediate marketing

courses (Thoms & Williams, 2008). The authors stated, "For many deaf and hard of hearing people English is a second language" (p. 4), and they proclaimed the potential for audience response systems to support a variety of learning styles. The majority of students participating in this study expressed high levels of satisfaction associated with the use of audience response systems, reporting that they made lecture classes more engaging, motivating, and participatory (Thoms & Williams, 2008, p. 6). Participants also enjoyed having the ability to see one another's answers to quiz questions or polls while also having the benefit of anonymity, causing them to feel more comfortable with participating in class discussions in this nonverbal way (Thoms & Williams, 2008, p. 6).

This feature may be appreciated by other groups of English language learners, in addition to deaf learners, especially when they are a minority group among native English speakers. However, it is also postulated that deaf and hard of hearing students learning English as a second language may be very different than most other English language learners because American Sign Language is visual and kinesthetic in nature, as opposed to spoken languages. Audience response systems may be more accessible to deaf and hard of hearing students, and more quickly accepted by them, than other cultural groups, implicating a possible need for research on their use with other types of second language learners.

Patry (2009) confirmed that, although much research has been done with audience response systems, it tends to be focused on its use in specific fields such as science, and more must be done in other settings to determine its educational value (p. 2). Patry stated, “There has not yet been systematic research that compares different pedagogical

uses of clickers, and such research is critical to the future of effective use of clickers" (p. 2).

English Language Learners in the United States

English language learners compose a large segment of the United States population, and this subgroup is growing in number as people continue to immigrate from a variety of countries (Goldenberg, 2008). Chen, Kyle, and McIntyre (2008) reported that by 2030 approximately 40% of all K-12 students in the United States would be designated as English language learners. The number of English language learners enrolled in American schools rose by 57% between 1997 and 2007 (Ballantyne et al, 2008). In a local analysis of changing demographics, Shannon (2008) reported that the county in which the school district she studied was located showed a Latino population increase of 167% between 1990 and 2000.

Upon further examination of Shannon's (2008) article, including the description of the demographics of the area, the school district's mission statement and the core values listed in the district's strategic plan, it was determined that the school district in her study was the same district as the location for this present study. Shannon reported that this geographic region "is home to the largest migrant worker union in the region" (p. 23), and that, in addition to a significant increase in the Latino population, the Russian population has also increased and comprises a large part of the community. She described the school district's strategic plan as "inclusive, equitable, and positive" (p. 24), and pointed to one core value in particular that emphasizes the district's commitment to all students becoming literate in more than one language.

Another of the district's core values stressed the importance of family as "the strongest influence on the growth and development of an individual" (Woodburn School District, 2008, p. 1). The demographics of this geographic region and the philosophy of the school district emphasizing biliteracy and family involvement create a location that were well suited for the present study. The high concentration of English language learners in this community may contribute to the validity of this study and may improve the ability to generalize results to a greater extent than would be possible in less diverse communities. Most parents of students in this school district are English language learners; the district provides evening courses in English, technology, and vocational skills at no cost; computers with Internet access are made available to parents to use; and the results of this study may have relevant implications to many of the school districts' parents.

The National Center for Education Statistics (2009) classified students as English language learners if they have limited English proficiency and if they speak a language other than English in the home. The Office of English Language Acquisition (2008) emphasized the need for specialized educational programs in the definition of English language learners. English language learners are classified as students that need additional instructional support in order to understand the curriculum and progress academically (Office of English Language Acquisition, 2008). Students who have successfully completed English language proficiency assessments administered in schools are classified as Fluent English Proficient (FEP), while students that have not passed these assessments are identified as Limited English Proficient (LEP) (Office of

English Language Acquisition, 2008). Even those students that are reclassified as fluent English speaking may need language support beyond that provided to native English speakers to ensure that they acquire Cognitive Academic Language Proficiency (Cummins, 2000, p. 58) and are prepared to successfully graduate from American high schools and pursue higher education.

In addition to having to learn and function in a second language, English language learners in the United States often face additional challenges such as high levels of mobility (Shannon, 2008), poverty, and low levels of parental education that may be related to the discrepancy in standardized test scores between native and non-native English speaking students (Ballantyne, Levy, & Sanderman, 2008). Several different educational models exist in the United States to respond to the needs of English language learners, and some controversy exists concerning which programs should be utilized. Some of the controversy may be more political in nature than educational.

The English-Only Movement

One illustration of the controversy surrounding the instruction of English language learners is the English-Only movement that has led some states such as Massachusetts, Arizona, and California to ban bilingual education from public schools (Jong, 2008). State ballot initiatives were passed to enforce English-only policies, despite years of research indicating that the use of students' native language allows English language learners to progress in other academic areas along with their English-speaking peers while they are acquiring their second language (Crawford, 1999; Cummins, 2000; Krashen, 1982). Literacy skills have been shown to transfer from one

language to another, speaking in one's native language has not been shown to hinder English development, and becoming fluent and literate in two or more languages may stimulate cognitive development (Collier & Thomas, 2001; Crawford, 1999; Cummins, 2000; Krashen, 1982). Whether states support or reject bilingual education, the large numbers of English language learners in American schools that continue to increase make it likely that most teachers will have English language learners in their classroom.

According to the United States Department of Education (1997), 29.5% of teachers with English language learning students in their classrooms had been trained to work with this special population. It is assumed that an even smaller percentage of teachers that work with English language learners are bilingual and, therefore, able to provide native language support to English language learners. These statistics indicate that there may be a need for instructors to acquire tools and strategies that will help them more effectively instruct and assess English language learners in ways not dependent on the verbal language abilities of either the instructors or the students.

The lack of teachers trained to work with English language learners may have contributed to an educational atmosphere of misconceptions. In 2006, more than 70% of surveyed teachers reported that they believed English language learners should be expected to learn English within 2 years (Ballantyne et al, 2008), although researchers in second language acquisition indicated that it takes much longer to acquire language skills adequate for academic success (Cummins, 2000). Ballantyne et al also reported that 32% of teachers surveyed believed that students' oral language capabilities in their second language were indicative of their cognitive abilities; in order words, they assumed that

students who were not able to express themselves fluently in English were also unable to comprehend content delivered in English. The use of tools such as audience response systems that enable students to respond nonverbally may help to dispel these misconceptions.

Second Language Acquisition Theory

Krashen (1982) pointed out the irony in the fact that second languages are traditionally taught with methods such as drill and memorization, grammar analysis, and scripted repetition; while research in second language acquisition has consistently supported the theory that languages are better learned by providing opportunities to use them in a natural way for authentic communication. While technology tools may facilitate language instruction and motivate learners with interactive activities, Krashen warned that they could not ensure acquisition; rather, that materials and methods that support communication should be utilized. He indicated "failure of researchers and teachers to interact" (Krashen, 1982, p. 3) as a reason for the lack of connectedness and interaction between second language acquisition theory, applied linguistics relevant to practical problems, and approaches developed by experienced instructors. He emphasized that there is no one very effectively to promote second acquisition and that instead, the various approaches should be combined to enhance differentiation and increase effectiveness.

Acquisition versus Learning

Krashen (1982) proposed that language acquisition and language learning are very different from one another. While language learning involves formal instruction,

emphasis on grammar and form, and conscious awareness of language rules, language acquisition was described as a natural, unconscious process similar to how children acquire their first language. He insisted that the ability to acquire language in a natural way does not disappear in adulthood, but that an approach that emphasizes the messages communicated through language rather than grammar and form is necessary to promote this ability.

Natural Order Hypothesis

The Natural Order hypothesis contends that language acquisition progresses in a predictable pattern, with language functions and forms being learned and internalized in a specific order. This hypothesis may have implications for the design and implementation of learning experiences for second language learners. Acquisition may progress more quickly if the language forms emphasized during instruction follow a natural sequence.

The Monitor Hypothesis

The Monitor was described by Krashen (1985) as mental judge of the correctness of language form, function, pronunciation, and grammar (p. 8). The Monitor is not active during language acquisition, but it focuses on error correction during formal language learning experiences. It slows the learner down, increases self-doubt and decreases self-expression. For this reason, Krashen (1982) did not advocate error correction and direct instruction of grammatical as strategies for language instruction (p. 8). In order for the Monitor to function, Krashen asserted that three conditions are required: time to think, focus on form, and awareness of the rules of language. In natural conversation, there is not sufficient time to think about form without becoming hesitant; the focus in

conversation is on meaning rather than form, and it is unreasonable to expect even learners with high levels of proficiency to be aware of all the complex rules of a language (Krashen, 1982, p. 16). Krashen described three distinct types of Monitor users: those that are overly self-critical in their use of language, those that do not self-correct at all, and optimal users that employ the Monitor under appropriate conditions such as in writing and delivering prepared speeches.

Comprehensive Input

While language output in the form of verbal expressions made by learners was described as unnecessary for language acquisition, Comprehensible Input was argued in the Input Hypothesis to be the most critical element in the promotion of language acquisition (Krashen, 1982, p. 20). It was contended that acquisition occurs when language learners hear messages in the target language that are focused on meaning and containing structure that is slightly beyond the learners' present knowledge and ability (Krashen, 1982, p. 20). The ability to understand language structures that learners have not yet acquired is possible because contextual cues facilitate understanding and acquisition. These cues include language context, nonverbal cues, and prior knowledge.

The Affective Filter

The Affective Filter was described as a state of mind connected to language production (Krashen, 1982, p. 30). A low Affective Filter is characterized by high interest and low anxiety, creating a psychological state that promotes language acquisition. High levels of anxiety, low self-confidence, and lack of interest characterize a high Affective Filter. A high Affective Filter was argued to be detrimental to language

acquisition. Krashen contended that language acquisition is dependent on large quantities of Comprehensible Input and a low Affective Filter. It can be argued that the Affective Filter hypothesis and the Monitor Hypothesis are closely related because excessive self-evaluation and self-criticism may lead to a high Affective Filter. Krashen (1985) advised against forcing learners in the beginning stages to express respond verbally in the target language, correcting errors, and enforcing grammatical accuracy because of the tendency for these practices to heighten the Affective Filter and inhibit language acquisition. Students may remain for some time in a Silent Period, internalizing the target language before feeling confident enough to express it. Students may participate in games and discussions, responding in the second language or in their native language in response to the teacher's Comprehensible Input delivered in the language being learned. Krashen (1985) posited that it is not the act of students speaking that leads to acquisition, but the Comprehensible Input they receive (p. 39).

It was contended by Krashen (1982) that forcing early production of a second language is “the single most anxiety-provoking thing about language classes” (Krashen, 1982, p. 74). He suggested that instructors determine their students’ levels of understanding by observing nonverbal cues such as nods and visual cues. Once learners begin to verbalize in the target language, Krashen warned that an instructor’s natural inclination to correct errors should be stifled because it may cause students to become defensive and concerned more about form than communication (p. 75). He recommended language courses that utilize photos, pictures, real artifacts, and activities that connect to the learner's prior knowledge in order to provide Comprehensible Input.

He also suggested enjoyable games and activities, soothing music, comfortable chairs, a casual learning environment, and icebreaking activities to lower the Affective Filter (p. 28).

The Silent Period

Krashen (1982) explained that the Silent Period is an expected phase in language acquisition in which the learner may not produce verbal utterances in the target language for up to six months or sometimes more. When the learner in beginning levels of language proficiency does produce utterances in the target language, it is in the form of memorized phrases made up of words that the learner may not understand in isolation (Krashen, 1982, p. 26). Although the learner may not speak in the target language, he emphasized that language is being acquired through listening and understanding Comprehensible Input spoken by others, and that the learner will speak in the target language when he or she feels competent and ready to do so. One problem identified in the instruction of second language learning adults was that they are often not allowed to remain silent until they feel ready to speak in their second language. Krashen (1982) indicated, "They may be asked to produce very early, before they have acquired enough syntactic competence to express their ideas" (p. 27).

Most language instruction methods, including the grammar-translation approach, the audio-lingual approach, the cognitive-code approach, and the direct method, were criticized by Krashen (1982) for failing to provide a sufficient amount of Comprehensible Input. Other approaches, such as Total Physical Response methods (Asher, 1995), and the Natural Approach were promoted as effective approaches for beginning language

learners. The Total Physical Response approach requires learners to respond nonverbally to commands given by the instructor, developing receptive language skills before they are ready to vocalize in the target language (Asher, 1995). Total Physical Response was advocated because of its applicability to all ages of learners, the opportunity it provides to learners with lower levels of language proficiency to feel successful, and its compatibility with natural cognitive functioning (Asher, 1995). The Natural Approach involves the learner in games and activities that promote the acquisition of language in an authentic and fun way, but Krashen emphasized that the Total Physical Response approach and the Natural Approach are not effective for language learners at intermediate or advanced proficiency levels (Krashen, 2003, p. 12-13). He insisted that learners at higher levels of language proficiency need to progress beyond the development of basic interpersonal communication skills (Cummins, 2000, p. 58) acquired within the first one to three years of second language acquisition to cognitive academic language proficiency (CALP) that requires between five and seven years to fully develop.

In comparing the classroom environment with the real world, Krashen (1982) pointed out that the controlled environment of the classroom allows instructors to provide more Comprehensible Input than is possible in the natural environment. Although real world environments may provide more target language input than the classroom, much of the input may not be comprehensible to learner in the beginning stages of language proficiency. Simple exposure to a new language in a real world environment, the radio, or television programs was described as unhelpful "noise", incomprehensible input that does not facilitate language acquisition (Krashen, 1982, p. 63). When learners are

bombarded by an overwhelming amount of content out of context in addition to extraneous noises in the environment, they may be confused and language acquisition may be hindered (Krashen, 1985, p. 11). He identified this "eavesdropping" form of exposure to a second language as the experience children may have being raised in a household where some family members talk to one another in a language that they do not teach their children or use directly with them. To facilitate language acquisition, he advocated language instruction in a classroom environment that is "comprehensible, interesting, or relevant to the learner, not sequenced grammatically, and provided in sufficient quantity" (Krashen, 1982, p. 125).

Krashen (1985) explained that classes in a second language could be more beneficial for beginners than traveling to the country where the target language is spoken because Comprehensible Input is provided in a controlled way, rather than overwhelming the new learner with many random voices speaking all at once, out of context, and amounting to incomprehensible noise. He recommended traveling to the country where the target language is spoken for intermediate and advanced speakers who are capable of comprehending a greater amount of input and may benefit from the added exposure to the second language in its natural setting (Krashen, 1985, p. 11). However, he pointed out that the controlled environment of the classroom also has inherent limitations, such as a lack of variety (Krashen, 1982, p. 59). Although Krashen (1982) insisted, "The classroom will probably never be able to completely overcome limitations" (p. 59 par 5), this may not be true in the 21st century when technology may provide simulated or

virtual learning environments that offer the benefits of classroom controlled content with the benefits of real world authenticity.

One of the decisions required in the instruction of English as a second language is whether to use a processing instruction approach or a content-based approach. Krashen (1982) argued that meeting all English language learners' needs in a single classroom is difficult because of the varying proficiency levels, interests, prior experiences, and learning styles (p. 161, Para. 4). He also contended that the artificial nature of the classroom environment for learning English may be detrimental to teachers' efforts to provide authentic language learning experiences that emphasize communication (Krashen, 1982, p. 162) by raising learners' Affective Filters.

A content-based instructional approach may solve many problems inherent in traditional English as second language classes, especially for adults. For example, if English language skills are taught in the context of a basic computer skills course, it can be assumed that all the students that enrolled in the course are interested in the common goal of increasing their technology skills and knowledge. Learners' Affective Filters may be expected to be low because the focus would be on content they find relevant and interesting, rather than their own language abilities. The influence of the Affective Filter would also be minimized because, "The absence of native speakers in the class would help to insure that the input is comprehensible" (AUTOR, DATE, p. 172). Affective Filters may also be expected to be lower in ungraded courses for adults that enroll because they want to develop skills and knowledge, not to earn a degree or certificate.

Krashen (1985) asserted, “There is no reason that subject matter teaching cannot be extended to other second language acquisition domains, and utilized to at least supplement the second language classroom and provide some help in the difficult transition from language class to real world” (p. 171). It is necessary for that subject matter to be “sheltered” (Krashen, 2003, pp. 12-13) in order to make the content comprehensible and gradually to build advanced cognitive academic language proficiency in learners (Cummins, 2000, p. 59). Krashen (1985) proposed sheltering instruction by providing background information in the form of pictures, real life artifacts, and students' native language to make the second language input comprehensible (p. 27). Sheltered content instruction may be especially important for students that must acquire other skills in addition to English language fluency; for example, children may be held accountable for meeting several academic standards in K-12 state tests, and adults may be motivated to acquire skills and knowledge that may increase opportunities for employment.

Adult English Language Learners and Adult Education Programs

In addition to the rapidly increasing numbers of English language learning K-12 students in the United States, Mathews-Aydinli (2008) reported that adult English language learners compose "the fastest growing segment of learners in adult education programs" (p. 198). The Center for Applied Linguistics (2010) reported that 46% of adult education students are identified as English Language Learners. Mathews-Aydinli (2008) contended that adult English language learners' educational needs are not being adequately met, as evidenced by high dropout rates from adult education programs and

low levels of achievement (Mathews-Aydinli, 2008, p. 199). Mathews-Aydinli (2008) stressed that there is a critical lack research on adult English language learners (p. 210). She suggested that research be done to study instructional practices with adult English language learners that could "actually--and measurably--be shown to raise communicative competence" (p. 211).

There are several reasons that adult English language learners may be motivated to learn English. Dewaele and Thirtle (2009) contended that this group of people was motivated to learn English because of their awareness of English fluency as necessary "in order to function socially" (Dewaele & Thirtle, 2009, p. 644). Technology skills and knowledge may also greatly enhance opportunities for employment, a significant benefit in light of statistical information indicating that most English language learners suffer from poverty and low levels of education (Ballantyne et al, 2008). Learning English may provide adult English language learners easier access to government and community information and services, improved communication with children's schools, and enhanced ability to help their children with schoolwork.

Adult education programs for English language learners that provide instruction in the use of current technologies while also developing English language proficiency in relevant contexts may offer significant benefits. These potential benefits include increased employment opportunities, improved self-esteem, continuing educational opportunities, greater understanding of children's school experiences and their teachers' expectations, better partnerships with their children's teachers and other school personnel, and enhanced parental guidance skills. Students from preschool age through

high school are using and being exposed to technology at a steadily increasing rate and, in addition to English language skills, parents need technology knowledge and skills so that they can provide supervision and guidance to their children in an increasingly multicultural, technologically connected world.

In regard to a critical age for learning language, Krashen (1981) rejected the concept of language learning ability disappearing at puberty (p. 77). Although he did not rule out the possibility of a critical age for language acquisition, Krashen pointed out several other possible explanations for children acquiring a second language more readily than adults do. Some of these reasons are the psychological hindrances present during adolescence such as self-consciousness that could heighten the Monitor Effect (Krashen, 1981, p. 76). In addition, adolescence coincides with the period of notational symbolization described by Gardner (2004), in which the learner becomes intent on producing formally correct forms of language, conflicting with natural, unconscious language acquisition (p. 76). In other words, Gardner's (2004) period of notational symbolization can be viewed as the age of Krashen's (1982) Monitor development and cognitive control. It is argued that particular challenges exist for the instructor of adult English language learners; they may suffer from a lack of self-confidence and fear of being publicly humiliated in ways that do not occur to young children. These challenges may need to be considered in order to design and implement an effective adult education program and create an empowering classroom environment.

One of the problems with most adult education programs available for English language learners is that the classes offered focus only on basic life skills vocabulary that

may not be relevant or useful for many immigrants who may be highly educated professionals in their native countries (Wrigley et al, 2009). This type of student may be more interested in classes that are of a higher academic nature or focused on professional job skills. Immigrants to the United States that are English language learners may be at a disadvantage in regard to employment and the ability to support their families (Wrigley et al, 2009). In light of second language acquisition research indicating that development of cognitive academic language proficiency requires five to seven years to develop (Cummins, 1996), it is suggested that adult English language learners do not have the luxury of time that children do. It is contended that they may need to acquire technology skills necessary for success in the 21st century, and they must accomplish this in less than five to seven years. This is the reason that the course proposed to be taught as the setting for this research study is on basic technology skills, with English language skills being secondary. "Adults who have only had a few years of schooling are likely to struggle with literacy in any language, and acquiring literacy in a new language can be challenging" (Wrigley et al, 2009). The use of audience response systems is hoped to bridge the distance between receptive and expressive English language skills so that learners can acquire basic computer and other technology skills before acquiring fluency in English at the level of academic proficiency. It was suggested that vocational programs be available to help immigrants develop job skills without requiring them to become proficient in English first, "offering hands-on training in vocational skills without requiring strong English literacy skills" (Wrigley et al, 2009, p. 20).

Relevant, task-based learning experiences were advocated for English language instruction adult English language learners to increase interest and motivation, and to build schema about the English content (Ibarz & Webb, 2007; Lambert, 2008; Mathews-Aydinli, 2008; McKay & Schaetzel, 2008). While adult education programs for English language learners were referred to as inadequate, the need to improve language and vocational skills of this population was described as critical for the sake of "economic stability" (Mathews-Aydinli, 2008, p. 199). Many adult English language learners were reported to express a desire to return to the profession they left behind in their native country, but often find themselves limited to menial jobs with low pay because of their lack of English language fluency in their professional field (Lambert, 2008). Wrigley et al (2009) advocated for educational programs that specifically respond to the needs of adult English language learners in order to "capitalize on the experience and expertise of immigrants would mean not only an investment in new Americans but could also serve to strengthen communities and the nation as a whole" (p. 23). Technology skills were identified as critical for professional success in the 21st century, and adult English language learners expressed satisfaction about developing their English language skills and computer skills at the same time, (Ibarz & Webb, 2007, p. 219).

Particular factors may influence the use of technology with adult English language learners compared with its use with K-12 English language learning students. Increased student age was correlated with increased language anxiety and decreased levels of motivation (Bernaus, Moore, & Cordeiro, 2007; Wray & Fitzpatrick, 2010). Adult English language learners were described as being more anxious than younger

learners because of worry about “making mistakes, losing face, criticism, negative evaluation, and judgmental remarks” (Pichette, 2009, p. 77). Noormohamadi (2009) concurred, explaining, "Adults especially can experience apprehension because they cannot present themselves in the new language as they can in their native language" (p. 41). Coryell and Chlup (2007) explained that older students may be resistant to using technology, but that eventual buy-in was shown to "help them overcome learning/acquisition barriers (and) reduced the generation gap" (p. 270). This may be especially important in the case of English language learning parents because development of their own technology knowledge and skills may help them provide guidance to their children.

It was emphasized that care must be taken not to overwhelm or confuse English language learners with overly complex technology tools and tasks (Coryell & Chlup, 2007). Clarity and conciseness of directed instructions, active learning opportunities, and collaborative learning environments may help achieve a balance between English language acquisition and the development of relevant 21st century skills. Before an instructor utilizes technology for instructional purposes, Coryell and Chlup (2007) stressed that users must first be comfortable using the technology, explaining:

For the computer inexperienced and often fearful adult learners, teachers would use hand-over-hand methods with the mouse, alternative, shorter tasks were provided, success was facilitated at every opportunity, and printed tasks were assigned, so students could have physical proof of accomplishment. One instructor emphasized the importance of having tangible evidence of success so the students could bring home their work to

their families and friends. Allowing students enough time and patience to complete tasks and assignments was also key to keeping reluctant computer users engaged. Ultimately, "train students how to before asking them to do" is advice that resonated throughout the data (p. 270).

Feedback was identified as a critical component in the instruction of adult English language learners through a variety of means, such as individual conferences and "anonymous student response forms" (Coryell and Chlup, 2007, p. 273). In addition, “controlled, imitative activities can make students feel secure enough to make their first utterances” (Gibson, 2008). Technology tools may facilitate the creation of these kinds of learning opportunities, especially in technology skills classes taught in English.

Utilization of Technology in the Instruction of Second Language Learners

Krashen (1985) suggested books and tapes as "components of the language labs of the future" (p. 21) because they provide Comprehensible Input with the student in control of topic choice and pace of the lessons. Because they are independent and self-paced, the Affective Filter is low and language acquisition is high. Krashen's statement leads one to conjecture about "language labs of the future" (p. 21) if the statement were made today. Computer programs can provide the same Comprehensible Input in audio and visual form, including more interesting and motivating learning activities such as simulations. Additionally, they can provide an interactive feature that allows students to respond by clicking, speaking, or typing, conducive to a low Affective Filter because the student is not expected to verbalize the target language in a face-to-face situation.

Although it can be surmised that technologies such as multimedia materials may provide Comprehensible Input in a stimulating way, a danger may exist for educators to be seduced or pressured to teach with the latest technology advancements in mind, rather than educational needs of the students. Although technology in education is supported under appropriate conditions, it is argued that technology should be seen as a tool, guided by research-based pedagogy and practice rather than an end in itself. Cummins, Brown, and Sayers (2007) insisted, "Expensive technological supports are neither necessary nor cost effective to teach basic literacy skills to the general student population" (p. 106).

However, the meaning of literacy may be changing from its previous definition that was limited to the ability to read and write in one's native language to 21st century technological skills and knowledge in addition to basic reading and writing proficiency (Kamil & Lane, 1998).

Brown et al (2007) emphasized the importance of aligning any instructional approaches with natural cognitive functioning by "Promoting deep understanding, building on prior knowledge, permitting learners to control the learning process, engaging learners in extensive reading, supporting learners in accessing curricular content, and enabling them to harvest the language they are reading" (p. 108). The authors asserted that technology could facilitate the development and implementation of programs that promote this authentic learning. However, they insisted that software programs should be evaluated for their ability to meet five criteria: relation of new content to prior knowledge, promotion of active learning, multiple opportunities to be

exposed to new vocabulary, teaching of critical reading skills, and promotion of lifelong reading habits (Brown et al, 2007, p. 109, par 2).

Black (2009) identified digital literacy skills necessary for professional and academic success in the United States in the 21st century as "basic print literacy, scientific, economic, technological, visual, information, and multicultural literacies as well as global awareness (p. 689). It is suggested that English language learners are a valuable resource as a workforce in 21st century America because of their bilingualism, multiculturalism, and inherent awareness of global issues. This is another reason why technology courses designed specifically for adult English language learners are advocated for their potential to affect positive social change.

Black (2009) contended that an increasing number of American citizens are English language learning immigrants, and that "an investment in educational programs that not only develop language skills and literacy skills but also capitalizes on the experience and expertise of immigrants would mean not only an investment in new Americans but could also serve to strengthen communities and the nation as a whole" (p. 23). Information literacy was identified as the ability to locate and evaluate relevant information (Black, 2009). "This includes recognizing when information is needed and then using technology, such as communication networks and electronic resources, to locate, evaluate, synthesize, and put this information to use" (Black, 2009, p. 693). For this reason, a course designed for adult English language learners that emphasizes development of technology skills as the content taught through English is recommended.

Cummins (1996) commented that instructional strategies such as cooperative learning empower learners by accepting and utilizing their multilingual language abilities, skills, and life experiences. They also create a collaborative classroom environment in which students "are able to participate competently in instruction as a result of having developed a secure sense of identity and the knowledge that their voices will be heard and respected within the classroom" (Cummins, 1996, p. 16). For this reason, it is suggested that limiting this course to English language learners, rather than integrating native English language speakers in the class, and using audience response systems to facilitate communication in English, will create a less intimidating environment where students will feel comfortable taking risks and expressing opinions.

Forms of Non-Verbal Response

Mohr and Mohr (2007) sought to determine specific factors that may encourage English language learners to participate in class discussions, to examine the affect of teachers' behaviors and attitudes toward these students, and to evaluate how teachers' beliefs about these types of students may affect their teaching practices. The researchers noted that the English language learners spoke very little in class and were rarely asked direct questions. When teachers did ask these students questions, they were cognitively low-level questions that required only one or two word answers. Teachers explained that they were trying to allow students time to progress through the Silent Period of language learning, but this response continued beyond ten months and the researchers perceived the students as neglected (Mohr & Mohr, 2007, p. 443). The authors identified a set of possible student responses to teachers' questions and developed helpful teacher responses

that may involve English language learners more in class discussions and encourage participation. This set of responses, called a Response Protocol, was designed to increase English Language Learners engagement and participation levels. They emphasized that teachers' good intentions may be harmful if they promote passivity in students, and that honoring the Silent Period of language acquisition may lead to exclusion of English language learners from classroom discussions and activities (Mohr & Mohr, 2007, p. 447, 2). The authors advocated for teachers having high expectations for these students, allowing them enough wait time before responding, encouraging clarification or elaboration, and not focusing on grammar and pronunciation.

Yourstone, Kraye, and Albaum (2008) conceded that other feedback methods such as response cards could accomplish some of the same benefits of audience response systems, such as providing students with correct answers immediately and allowing time for class discussions, but that the process would be slower and use up more class time (p. 78). Patry (2009) confirmed, "The systems have clear advantages over more traditional show of hands or flash card student response systems because they can quickly and accurately aggregate and quantify students responses" (p. 2). Stowell and Nelson (2007) compared the use of clickers with other nonverbal methods of student response such as hand raising and response cards, and they reported that participation rates were highest in the group that used clickers, followed by the hand-raising group (p. 253). They indicated that the factor that made the difference in participation rates between the students who used the clickers with those that used response cards was the anonymity provided with clicker use (p. 253). While it was conceded that paper response cards require much less

financial investment, they were determined to be less effective than audience response systems because they are "susceptible to the influence of social conformity" (Stowell & Nelson, 2007).

Another form of nonverbal response studied was the abstract scratch-off immediate feedback assessment technique (IF-AT), a tool similar to a lottery scratch-off ticket, with rectangles to scratch off that represent multiple choice answers (Cotner et al, 2008). Although the format of response choices is similar to audience response system questions and offers many of the same benefits, such as increased student interaction and immediate feedback, the researchers' comparison of IF-AT to audience response systems indicated student preference for the response systems (p. 442). They attributed this preference to students to being able to respond anonymously, but also see the responses of their classmates and compare their responses with others (Cotner et al, 2008, p. 442). Another difference between the IF-AT tool and the audience response systems was the price, $100 for a pack of 500 scratch-off sheets, compared to the $30 to $60 that students must spend for an individual clicker.

Clayton and Woodard (2007) reported that having students show response cards allows teachers to immediately assess understanding and participation, while also "increasing the frequency of class participation and the number of students that participate" (p. 250). In addition to measuring levels of student engagement and participation, the researchers surveyed participants to determine their perceptions about the use of response cards, for example, whether they felt childish holding them up (p. 253). They commented that "The cost of raising your hand to answer a question in the

presence of 60 students is much higher than it is when raising a card in tandem with the rest of the students" (Clayton & Woodard, 2007, p. 256). The results demonstrated that the use of response cards were positively received by students, and that they did not feel childish about using them, although they felt awkward until they became accustomed to using them (p. 257). This initial awkwardness may be expected with the use of audience response systems as well, until students become accustomed to using the technology. Response cards made assessing understanding more convenient for teachers because it allowed teachers to assess all students' understanding, rather than having to call on only one student from a small amount of raised hands. Clayton and Woodard (2007) concluded that the use of response cards resulted in more active processing and student engagement.

Randolph (2007) also explored the use of response cards to determine if they had any effect on student engagement, academic achievement, participation, and off-task behavior. It was reported that, in spite of research findings supporting the use of active response activities demonstrating that they decrease off-task behaviors and increase learning, Randolph reported, "Less than 1% of total school time" (p. 113) was spent with students engaged in active learning. Response cards were described as "low tech tools for increasing active student response" (Randolph, 2007, p. 114) that give instructors immediate feedback that can be used for formative assessment. Wood, Maybry, Kretlow, Lo, and Galloway (2009) characterized this form of response as an "effective, efficient, and inexpensive way to engage all students during whole-class instruction" (p. 39). The use of ready-made response cards and write-on response cards was compared with the

practice of hand raising to answer questions. These strategies were reported to have been used from preschool through university levels of education, and Randolph (2007) noted that response cards have been commonly used with English language learners (p. 114). It is suggested that preprinted cards may be more useful for use with English language learners because they do not require as high of literacy levels in English. Randolph (2007) showed that participation and on-task behavior were significantly measured to be higher with the use of response cards compared to hand-raising (p. 125). It was emphasized that the use of response cards, although recommended, should be accompanied by other best practices shown to increase engagement and learning (p. 126). Disadvantages to the use of response cards were reported to be the time necessary to distribute them to students, and a perception by older students that they were childish (Randolph, 2007, p. 126).

Another form of student response that may not raise the Affective Filter as high as individual hand raising and responding is choral response. On-task behavior and participation levels were shown to be higher, however, with the use of response cards than choral response or hand raising (Musti-Rao et al, 2008; Wood et al, 2009;). In addition, it is suggested that, while students may benefit from the verbal practice involved with choral response, the feedback to the instructor is not as effective for the purposes of formative assessment because it is difficult to discern which students are responding and whether responses are correct.

Audience Response Systems

Audience response systems (clickers) are technology tools used in education, business, and government environments, enabling people who may otherwise not be willing or able to speak publicly to express their views and opinions. They consist of a software application residing in the one computer and hardware in the form of an infrared or radio frequency receivers and remote control units the participants use to input simultaneous responses to questions that may be commercially produced or created by the facilitator. This tool has been compared to a television set remote control (Sullivan, 2009; O'Hanlon, 2007) and discussed as the voting device used in the popular game show, Who Wants to Be a Millionaire (Mula & Kavanagh, 2009). The telephone was described as a type of audience response system as it used as a voting device for the musical competition television show, American Idol (O'Hanlon, 2007). It is suggested that these references to elements of popular culture, and similar uses with tools that most people are accustomed to and comfortable with may make the tool more easily and quickly accepted than other emergent technologies.

No consensus appears to have currently been reached concerning a standard term for response system technology. Names commonly used for this tool, in addition to audience response system, include student response system, personal response system, group response system, classroom performance system, interactive student response system, electronic voting system, classroom feedback systems, zappers, group process support systems, group decision support systems, selected response systems, and wireless

transponders (Patry, 2009). For purposes of the present study, the term audience response system is used to refer to the technology tool.

Audience response systems are utilized for a variety of purposes: polls and group choices by anonymous voting, formative assessment to determine learners' understanding of content and enabling teachers to adjust instruction as needed, and summative assessment at the culmination of classes or presentations. Possible ways that the systems can be used in an educational setting include taking attendance (Sullivan, 2009), checking for understanding at intervals throughout a class lecture, conducting quizzes, voting, and conducting opinion surveys (Barnes, 2008, p. 531). More unusual uses of audience response systems include data collection in science classes (Henrickson, 2008), and replication of experiments in psychology classes in order to demonstrate behavioral phenomenon to students in an authentic way (Cleary, 2008). Another novel use of audience response systems was reported by O'Hanlon (2007), in which students used the response system to simulate the trial of Lizzie Borden.

Benefits Identified with the Use of Audience Response Systems

Advantages associated with the use of audience response systems include: anonymity, simultaneous active involvement of all students, immediate feedback for the teacher and students, and reduced anxiety for students (Barnes, 2008; Blood & Neel, 2008; Carnagahn & Webb, 2007; Edmonds& Edmonds, 2008; Hoekstra, 2008; Keller, Finkelstein, Perkins, Pollock, Turpen, & Dubson, 2007Lucas, 2009; MacGeorge et al, 2008; Morgan, 2008; Morling et al, 2008; Mula & Kavanagh, 2009; Nelson & Hauck, 2008; Patry, 2009; Salemi, 2009; Sullivan, 2009; Trees & Jackson, 2007; Walker &

Barwell, 2009; Yourstone et al, 2008;). Other possible advantages of using audience response systems that have been explored include heightened levels of learner engagement and motivation, improved academic performance and understanding of content, learner empowerment by enabling all participants to have a voice in discussions, and higher levels of satisfaction with courses by students and teachers (Barnes, 2008; Cunningham, 2008; Keller et al, 2007; Lincoln, 2008; Mula & Kavanagh, 2009; Premkumar & Coupal, 2008; Trees & Jackson, 2007).

Audience response technology allows participants to respond freely without self-consciousness or anxiety over having wrong answers, because only the leader is informed about participants' identity. In the case of group discussions involving sensitive or controversial issues, the facilitator can even modify the identification feature so that responses are made completely anonymously, further freeing users to express themselves without anxiety (Gentry, 2009). "While curious about the beliefs and practices of their peers, some students resist sharing insights about their own due to concerns about how their peers will react to such revelations. Lack of knowledge or experience, as well as feelings of fear, shame, embarrassment, or anger, often underlie such resistance" (Gentry, 2009, p. 62). Audience response systems allow concurrent active involvement by all participants, and provide immediate feedback regarding comprehension of content or opinions.

The immediate feedback available with the use of audience response systems can stimulate class discussions and engage students in persuasive arguments that may deepen understanding of the content. Yourstone et al (2008) stated, "The use of immediate

feedback systems with the ensuing discussion has the potential to change the meaning of the questions that are proposed to students" (p. 77). The fact that the questions are answered and discussed immediately may make the questions and their answers more meaningful and comprehensible to students. This immediate feedback can be contrasted with traditional quizzes in which students must wait a substantial amount of time before they find out the correct answers, often without the opportunity to discuss them (Yourstone et al, 2008, p. 80).

Yourstone et al (2008) also emphasized the potential for teachers to check continually for understanding of individuals and of the group as a whole, and to adjust instruction as necessary (p. 78). Teachers can immediately reteach or review problematic content, and opinions of large groups can be instantly assessed. In the case of public meetings or assemblies, audience response systems allow a large number of people to make their opinions or preferences known, enabling people who would otherwise not be willing or able to speak publicly to express their views and opinions. In schools, this may include students' parents who speak little or no English but may be able to express themselves nonverbally with audience response technology, especially if translation of content is made available.

Several studies have been done on the use of audience response systems in large university lecture courses (Hoekstra, 2008; MacGeorge et al, 2008; Patry, 2009; Trees & Jackson, 2007; Salemi, 2009). Trees and Jackson (2007) examined the use of audience response systems in large university level courses to determine if they may increase participation, enhance student engagement, and stimulate more active student

involvement in ways not possible with traditional teaching strategies with extremely large groups.

They are commonly used in universities with large lecture classes (Trees & Jackson, 2007) because they resolve the most significant problems inherent in classes with large numbers of students. In large lecture classes, it may be difficult for teachers to ensure that all students are participating and to asses understanding of presented content. Large numbers of students make it very difficult, in traditional classrooms, to involve actively students in learning activities. Trees and Jackson (2007) contended that active involvement, in addition to practice and relevant feedback, is a critical characteristic of classroom learning. The researchers contended that large lecture classes contribute to a "low-pressure, safe learning environment, with more flexibility in whether or not to attend class", but for others, the large lecture environment may feel impersonal (Trees & Jackson, 2007, p. 24). Patry (2009) confirmed that audience response systems may increase active participation in educational settings, such as large lectures, that have traditionally limited students' involvement to passive roles (p. 2).

Although active processing is advocated as a critical element to deep cognitive levels of learning, some students may resist having to consistently be involved and highly participative in courses, especially if their prior experiences and expectations of education are more traditional, passive forms (Trees & Jackson, 2007). Constructivist learning theory necessitates that the learners be problem solvers and active participants in the learning process. Traditionally, university students in large lecture classes have been able to skip classes without detection, or sit quietly in the back of the room, refraining

from answering questions or participating in discussions (Trees & Jackson, 2007, p. 25). The use of student response systems forces students into active roles in the learning process, a role that some students may not welcome because it "violates expectations that the large course professor will simply provide information that they then memorize for tests" (Trees & Jackson, 2007, p. 25). Older students were reported to be more accustomed to a passive learning environment (Bodie et al, 2008).

On the other end of the spectrum, some students in traditional classes consistently raise their hands to volunteer answers to questions and enjoy being outspoken in class discussions. Mula and Kavanagh (2009) indicated, "Assertive students did not dominate question time" (p. 10). Most students' and teachers' comments indicated satisfaction in the more egalitarian environment offered by the use of audience response systems, allowing all students to have an equal voice (Mula & Kavanagh, 2009). However, some students may resent losing the domination of class time and instructor's attention that they once had, when audience response systems eliminate the need for hand raising and create an egalitarian classroom environment where everyone's voice is heard.

Audience response systems have been shown to increase active processing and student involvement in course content (Keller et al, 2007; Lucas, 2009; Mula & Kavanagh, 2009; Nelson & Hauck, 2008; Sullivan, 2009; Walker & Barwell, 2009). Nelson and Hauck (2008) explained that the use of the systems helped to break up the pace of long lectures, resulting in better student attention spans (p. 58). Sullivan (2009) reported:

Students' heart rate drops severely in the first few minutes of a lecture. A spike in students' heart rate is clearly visible at the point in the class where a student raises a question. From this scenario, the assumption can be implied that the utilization of clicker-based question-driven instruction in lecture-format classes may raise students' heart rate, and therefore their activity level in class. (p. 336)

The practice of interspersing lectures with clicker questions may relate to Mayer's twelve principles of multimedia learning, specifically the segmenting principle (Mayer, 2009) because it breaks extensive amounts of input into smaller, more cognitively manageable segments.

In contrast to large lecture-type classes, students in some studies involving smaller classes demonstrated less student engagement when they used the audience response systems and reported that they believed their use hindered interaction between students and he instructor (Carnagahn & Webb, 2007; Morgan, 2008). Morgan concluded that this difference in student satisfaction with audience response use may be because large lecture-type classes are inherently impersonal and non-interactive because of the logistical difficulties of time and space, and the use of audience response system facilitates interaction in spite of these logistical barriers (Morgan, 2008, p. 35). On the other hand, smaller classes were more intimate and interactive, negating the need for audience response systems for the purpose of providing opportunities for interaction. It is argued, however, that their occasional use in small classes may still be valuable because of the anonymity of responses and the ability to ensure that all students have an equal voice.

The use of the student response systems enabled all students to be actively involved in lectures and learning activities, provided immediate feedback to the instructor regarding students' understanding of the content, and subsequently enabled the instructor to provide immediate feedback to the students if there were problematic areas. However, in spite of these benefits, the authors concluded that the results of surveys suggested the "tempering of the arguments for supporting response systems adoption in university classrooms" (Morgan, 2008, p. 34). Students with less experience in lecture courses responded more positively to the use of student response systems, arguably because they had less well-defined prior expectations of lecture courses.

Although caution was recommended when advocating for the use of response systems (Morgan, 2008), resistance to this instructional tool may fade as they become common features of the academic environment, in the same way resistance faded to acceptance when email replaced hard copy letters, laptop computers took the place of paper binders, multimedia presentations replaced overhead projectors, and dry erase boards took the place of chalkboards.

Several studies have been conducted in which researchers indicated that the use of audience response systems may have a positive effect on student achievement (Barnes, 2008; Blood & Neel, 2008; Cohen et al, 2008; Edmonds & Edmonds, 2008; Yourstone et al, 2008). Yourstone et al (2008) reported that test scores confirmed that audience response systems may have a positive effect on academic achievement, but they conceded that the positive effects could be attributed to the immediate feedback provided to students about their responses (p. 85).

Academic achievement and engagement levels were contended to be higher with the use of audience response systems than without (Blood & Neel 2008), but it was also asserted that higher levels of motivation and engagement are irrelevant if they are not connected with improved academic achievement (p. 376). Therefore, the authors conducted a study comparing test scores of university students utilizing audience response system technology in science courses with test scores of students in the same classes without the use of audience response system technology (p. 376). Their findings provided evidence that the use of audience response systems contributes to deeper learning, but indicated a lack of confidence about the reasons, postulating that it could have been due to the ongoing use of the audience response system throughout lectures keeping students' attention and providing immediate clarification of misunderstandings (Blood & Neel, 2008, p. 380). It was also possible that teachers adjusted their instruction as they diagnosed areas of misunderstanding and provided immediate feedback to students; therefore, it could have been a byproduct of audience response system use in the form of teacher behavior that contributed to the higher test scores rather than the audience response system use itself (p. 381).

Audience response system technology was also shown to improve test performance in a study of university students in introductory accounting classes, demonstrating greater gains for students with lower initial grade point averages than those with higher ones, but having no negative effects on any student's performance (Blood & Neel, 2008, p. 431, 2). The authors conceded that the higher test scores may have correlated with higher attendance rates resulting from increased motivation levels

associated with students' enjoyment of audience response system use, but even if this is true, it does not indicate any negative effects of using audience response system technology. Finally, audience response system technology was contrasted with technology tools such as calculators, and shown to enhance student learning without providing external performance aids; therefore, students did not become dependent on audience response systems and suffer without them in test situations as they did with calculators (Blood & Neel, 2008, p. 432). In light of these results, there does not appear to be any reason not to utilize audience response system technology, other than the costs involved. Trees and Jackson (2008) suggested that a full cost and benefit analysis be done to determine if the benefits of audience response system technology justify the expense of acquiring it (p. 432).

Edmonds and Edmonds (2008) reported results from their study confirming that the use of audience response systems may improve exam performance for students with lower grade point averages, while not having any negative effects on more advanced students' performance. They contended that the findings support the use of audience response systems for promoting higher engagement levels and improved learning, although the reasons for this were reported to be unclear (p. 379). They conjectured that the integration of audience response system use into traditional lectures may have helped maintain students' attention throughout the lesson, and that immediate feedback and "clarification of errors" (p. 380) may also have enhanced learning and improved achievement. An important distinction was made in this study between student response systems as tools used to enable students to express and report their knowledge, and tools

like calculators that aid them in figuring out answers. The study indicated that, as opposed to calculators that enhance speed and accuracy but do not contribute to learning, student response systems may actually improve learning by increasing motivation and engagement levels. In addition, while students' achievement may suffer in the absence of calculators or other tools that they depend on to help, them figure out problems, the student response systems in this study were only used during learning times and tests were taken without them. The authors reasoned that this supported the hypothesis that greater learning was achieved through the use of audience response systems (Edmonds & Edmonds, 2008, p. 432).

Because no negative effects for any groups of learners has been reported, it is suggested that the use of audience response system technology may be a valuable tool for creating more student-centered, constructivist classrooms at for English language learners while not detrimental to native English speakers. Edmonds and Edmonds (2008) conceded that the results of this experiment may not justify the cost of using audience response system technology on a wide scale, but costs for this tool may already be lower than they were when this study was conducted, and may continue to fall. The potential for student response systems to enhance egalitarian learning environments by allowing all students to express themselves, to increase student motivation and engagement, and to help at risk students without hindering others, suggests that their use may be a valuable tool in all educational environments and should be further studied to reveal their possibilities and limitations.

Trees and Jackson (2007) cautioned that the argument for acquiring audience response system technology for use in universities may be weakened because the findings in their study indicated varying levels of acceptance by students of this tool. Although audience response system technology was shown to possess inherent features that were presumed to be very effective with large lecture settings, including simultaneous involvement of numerous students, instant feedback, and convenient assessment, some students did not respond positively to this tool because they preferred the traditionally passive role of students in a large lecture class (Trees & Jackson, 2007, p. 25, 4). However, the study also demonstrated that students with less experience in large lecture classes were more likely to accept audience response systems and adapt to it as a part of their learning experience (Trees & Jackson, 2007, p. 32). O'Hanlon (2007) commented that audience response systems "have been around now for about a decade and are quickly becoming standard equipment in the 21st-century classroom" (para. 4). It is postulated that, as audience response system technology use becomes increasingly common throughout K-12 and college settings, resistance to the use of this tool in instruction will fade at all levels, just as it has for other forms of technology.

Disadvantages Identified with the Use of Audience Response Systems

There may be disadvantages to the use of audience response systems that must be explored and evaluated so that this tool may be used in a way most beneficial to respondents and facilitators. Although many studies of the use of audience response systems have indicated positive perceptions and attitudes about the tool by students (Barnes, 2008, Cunningham, 2008; Keller et al., 2007; Mula & Kavanagh, 2009),

students in other studies reported that they did not feel more engaged with the use of the tool (Cohen et al., 2008).

The limitation of question type to multiple choice, true and false, or numeric answers may be a critical drawback to using audience response systems. Although some response remote devices allow users to input text, the amount of text is limited to short answers, and a new problem of participants' varying levels of literacy may hinder instruction and learning. Beuckman, Rebello, and Zollman (2007) commented that short-answer and multiple-choice questions "do not replicate the kinds of open-ended questions that students have to answer on other course assessments" (p. 129). Although the clickers enable instant demonstration of learners' understanding or opinions, it is suggested that the use of audience response systems in a learning environment be balanced with authentic learning activities.

While positive results concerning academic performance have been recorded with the use of audience response systems (Blood & Neel, 2008; Trees & Jackson, 2008); some studies have shown academic results to be negligible (Carnaghan & Webb, 2007; Stowell & Nelson, 2007) or even negative (Morgan, 2008). Cohen et al (2008) reported that students in a large, introductory psychology class did not have heightened levels of engagement in comparison to students in classes without audience response systems (p. 48). In addition, attendance did not increase with the use of clickers, leading the authors to reject the hypothesis that the use of audience response systems increased students' engagement levels. The effect on engagement with the use of audience response systems was described by the researchers as null. Morgan (2008) reported that achievement

scores were lower and more students dropped the classes in which audience response systems were used, but they also conceded that the differences between the scores and attrition rates between the groups that used clicker and he groups that did not were not statistically significant (p. 31).

Carnaghan and Webb (2007) investigated the use of audience response systems in order to support or refute vendors' claims that their use increased engagement and participation levels and student learning. After evaluating the use of audience response systems in a management accounting class, the authors stated, "Contrary to our expectations, we find a decline in engagement, as proxied by student oral participation, when group response systems are used. We also find little evidence that group response systems lead to greater student satisfaction with the course" (p. 391). Walker and Barwell (2009) also reported that some students expressed negative attitudes about the use of audience response systems for peer review because they perceived the process as similar to a "popularity contest" (p. 1).

Another significant disadvantage demonstrated with the use of audience response systems is cheating in the form of students sharing answers or trading clickers in order to respond for one another (Cohen et al, 2008). The authors conceded, however, that sharing and discussing answers in a cooperative learning activity would facilitate learning and understanding; therefore, reviewing protocol for the use of clickers in various situations is suggested. Students, as well as teachers, indicated several disadvantages to the use of clickers, most of them technical in nature. Students reported that the clickers were complicated and difficult to use, and there were problems with clickers not

operating correctly: not turning on, turning off in the middle of the class, responses not being received, and problems logging in (Cunningham, 2008). These technical problems had the result of frustrating students instead of increasing motivation and engagement levels. Some students were aggravated by the cost of the clickers and being required to purchase them, and these negative feelings were exacerbated when the clickers did not work properly (Cunningham, 2008; Gentry, 2009). Students, as well as teachers, reported that it is easy for students to cheat or fake attendance with clickers by giving them to friends to respond for them, and some resented this lack of integrity and commitment.

Although audience response technology was shown to possess inherent features that were presumed to be very effective with large lecture settings, including simultaneous involvement of numerous students, instant feedback, and convenient assessment (Geddes et al, 2008; Hoekstra, 2008; Salemi, 2009), some students did not respond positively to this tool because they preferred the traditionally passive role of students in a large lecture class (Trees & Jackson, 2007, p. 25). The study demonstrated that students with more experience in large lecture classes had more deeply ingrained ideas of how they should operate, and inflexibility to new tools and instructional strategies that conflicted with their preconceived expectations. Some students enjoyed the large, impersonal nature of large lecture classes that allowed them to remain unnoticed in the back of the classroom, or even to skip classes, because of the logistical inability to take attendance using traditional means, and audience response system

technology suddenly enabled the instructor to hold each student accountable for their presence and participation (Trees & Jackson, p. 35).

In addition to human-related disadvantages to the use of audience response systems, such as cheating and lack of teacher preparation to use them effectively, disadvantages to the use of this tool includes technical difficulties that may frustrate students and teachers (Patry, 2009; Quinn, 2007). Cleary (2008) reported that a disadvantage of audience response systems is that there is no way to calculate the amount of time it takes each student to respond to questions, but conjectured that this may someday be possible (p. 44). A significant disadvantage of the audience response system technology is that most of the systems limit question types to multiple choice, true and false, and numeric responses (Cleary, 2008). However, studies have demonstrated that careful planning and design of questions can overcome these limitations and facilitate high-level cognitive processing and active engagement (Sullivan, 2009). Koenig (2010) reported that the biggest disadvantage to using audience response systems was the "decrease in class time for lecture notes and quantitative problem solving" (p. 34). Lucas (2009) also mentioned some disadvantages to using clickers in classrooms, including more preparation time and less time for teachers to lecture and, therefore, more time required of students to read the textbook on their own (p. 229). He emphasized, however, that there are only a few minor disadvantages shown to using the systems, and that use of clickers in combination with peer instruction "succeeded in raising the learning index by making students see their peers as a valuable resource" (p. 230). Koenig (2010) also

reported that, in spite of the reported disadvantages, all teachers in his study indicated that they would use the audience response systems in the future.

Audience Response Systems and Second Language Acquisition

The use of audience response systems may have the potential to eliminate or reduce many of the problematic areas of second language instruction. Krashen (1982) emphasized that spoken fluency in a second language is acquired through listening and reading, not by talking, and that it is "theoretically possible to acquire language without ever speaking the language aloud" (p. 60). The only reason he identified as important for target language output by the learner was to provoke conversation with others, thereby leading to increased amounts of Comprehensible Input. Because Krashen (1985) contended that speaking the target language aloud is not necessary for the acquisition of the language, it can be argued that the use of audience response systems may be beneficial to the language classroom by allowing students to express opinions, expression understanding or lack thereof, and to demonstrate knowledge nonverbally.

The opportunity to provide nonverbal responses could enable learners to take an active role in the learning process and to provide input into content and the way instructional materials are taught, as McKay and Tom (1999) advocated as critical for instruction of adult second language learners (p. 163). McKay and Tom (1999) explained that English language learners may feel embarrassed, fearful of being criticized or ridiculed, or worried about being misunderstood (p. 2). Learners with low levels of literacy or little traditional school experience may be easily overwhelmed or intimidated; therefore, McKay and Tom (1999) emphasized the need for instructors to assess their

students' interests, expectations, prior experience, learning styles, and goals. While this may be a difficult task to accomplish with beginning English language learners under traditional circumstances, audience response systems may enable instructors to understand better their students' wants and needs and to tailor learning experiences to meet them.

The ability to respond nonverbally made possible by the use of audience response systems may also support collaborative relations of power by enabling learners to interact with the instructor, other students, and the instructional material. Cummins (2009) asserted that, in classrooms characterized by collaborative relations of power, "Students in these empowering classroom contexts know that their voices will be heard and respected. Schooling amplifies rather than silences their power of self-expression" (p. 3). In addition, the use of audience response systems may enable learners in the beginning stages of language acquisition to be involved in more cognitively advanced content than Total Physical Response methods and the Natural Approach provide.

Total Physical Response methods and the Natural Approach were advocated by Krashen (1982) for English language learners in the earliest stages of language proficiency, before they are ready to speak in their target language. He advocated more authentic, relevant content-based instruction of English for intermediate English language learners, contending that Total Physical Response and the Natural Approach are too limiting to motivate them and lead to greater learning. However, it is suggested that the use of audience response systems makes it possible to provide cognitively high levels of

instructional material while eliminating the necessity for learners to produce verbal responses before they are ready.

While a high Affective Filter may be a barrier to authentic learning, audience response systems may lower the Affective Filter by offering anonymity and the opportunity to participate and express one's opinions without fear of being embarrassed or corrected in public. Premkumar and Coupal (2008) commented, "A student, hesitant to raise a hand in response to a sensitive question may feel no inhibition to responding using the audience response system" (p. 146, Para. 3). Sullivan (2009) confirmed that the use of audience response systems "alleviates students' fear of embarrassment in front of their peers" (p. 337). Lucas (2009) concurred, "It is well established that a student's perceived status is the most influential factor in determining his or her level of participation in a group" (p. 224), and that traditional cooperative groups are often dominated by the higher status students.

It can be inferred that English language learners rarely fall into the high status student category and, therefore, are less likely to make their voices heard in a small group or in the whole class setting. The use of audience response systems, however, ensures that each student has an equal opportunity to respond and can express their knowledge and opinions. Additionally, because the responses are anonymous, other members are unable to judge the responses according to the status of the responder. Mula and Kavanagh (2009) reported that students were less self-conscious about answer questions with the audience response systems because no one knew when they got an answer wrong, and they were able to see when other students did not understand the same

concepts with which they had difficulties. The researchers concluded that the use of audience response systems resulted in an increase in student participation in class (Mula & Kavanagh, 2009).

Pedagogy and Audience Response Systems

Many researchers cautioned that it is not sufficient to give students clickers and begin to use them in a haphazard fashion if cognitively advanced levels of learning are the desired outcome. Effective pedagogy is emphasized as the priority, while the technology is secondary. Blood and Neel (2008) discussed the possibility of a novelty effect in connection with the use of audience response systems (p. 381). It is suggested that audience response systems be introduced and that students be given many opportunities to practice with them in cognitively low-level activities and opinion-based polls before they are used for cognitively advanced questions used to assess student understanding or conduct summative assessments. Skinner (2009) stated that, "In order to move beyond gimmickry and academic funhouse techniques, instructors must carefully implement this technology" (p. 20, par 4). Careful construction of questions leading to cognitively high levels of discussion and thinking and alignment of audience response system activities with instructional goals was advocated in order to maximize the tool's potential to assess students' understanding and opinions. The use of Bloom's Taxonomy was recommended to help educators create effective questions (Skinner, 2009, p. 20).

Skinner (2009) emphasized that the creation of questions should be guided by "what it is that we want students to understand, what thinking skills we want them to use, and what beliefs we want to emphasize" (p. 21). In addition, Smetana and Wilson (2009)

recommended creating and posing questions to students that stimulate metacognition, "thinking about their thinking" (p. 20), because it causes students to think critically and reflect on their learning, leading to better understanding of the material. It is suggested that audience response systems could facilitate this metacognitive questioning when students' responses are preceded and followed by discussions and the distribution of responses is shown so that students can compare their own understanding with others. Korkmaz (2009) stated, "Students' first thoughts about issues are not necessarily their final thoughts nor their best thoughts. Through elaboration, students often reconceptualize and assess their own errors" (p. 521). This observation supports the concept of the questioning and discussion cycle as proposed with the use of audience response systems.

Instructors may also promote metacognitive behaviors by pausing during lectures for students to indicate anonymously whether they understand the material, and if review or additional clarification of concepts is needed. This practice may deepen learning because "self-questioning is a research-based practice that helps students independently monitor and regulate their thinking" (p. 25). Korkmaz (2009) contended, "Good questions are purposeful, clear, brief, natural, and thought-provoking" (p. 521) and he emphasized that questions should stimulate students' analysis and evaluation of content, not just require rote memorization of facts (p. 521).

Questioning was proposed by Korkmaz (2009) as a critical 21st century skill for professional and academic success (p. 513), and he emphasized the necessity of creating questions that require high levels of cognitive processing (p. 513, par 2). Although

questions are usually posed by teachers following a lesson to assess understanding of the presented content, the researchers suggested using questions to stimulate interest, curiosity, and prior knowledge before beginning a lesson (p. 514). It was also recommended that instructors address incorrect answers as well as correct ones as the basis of analysis and discussion. Most instructors, however, were reported to accept and dedicate class time only to correct responses. Korkmaz (2009) contended that teachers usually respond to incorrect responses by giving hints or partial answer until the correct answer is finally arrived at, and that some teachers even ridicule and humiliate students who respond with incorrect answers (p. 518). It is suggested that, if a significant portion of the class responds incorrectly to a question, it may be very beneficial to analyze students' reasoning and determine where critical misconceptions may lie.

Korkmaz (2009) noted that teachers usually select students to answer from the few that raise their hands and that, "if students didn't get their hands in the air immediately, they were effectively locked out of the discussion"(p. 515). Teachers also commonly posed "closed questions" (p. 515) with a single correct answer. This practice was determined to be contradictory to the development of high-level cognitive skills such as analysis, synthesis, and evaluation. A supportive, safe environment in which students feel safe to ask questions and take risks was determined to be necessary for the development of critical thinking skills (p. 514). It is suggested that the use of audience response systems may facilitate the creation of this type of safe environment, because students do not need to compete to be the one to answer a question--everyone has the opportunity to respond anonymously.

Premkumar and Coupal (2008) suggested twelve guidelines to help educators use audience response systems in effective ways that improve learning and engagement. The twelve guidelines proposed for the use of audience response systems are as follows:

1. Pedagogy should be emphasized over the technology. Active engagement should be the objective of using the technology.

2. Practice with the audience response system and become comfortable with it before using it with students.

3. Practice presenting questions spontaneously as well as creating questions in advance.

4. Explain to students how the questions posed relate to the learning objective, and emphasize that responses are anonymous in the case of sensitive topics.

5. Limit the number of questions to one every 20 minutes.

6. Test the system and the questions ahead of time to verify that they are valid and reliable.

7. Be prepared with a back-up plan in case the technology fails to work.

8. Allow three to five minutes for the presentation and discussion of each question.

9. Decide ahead of time whether the responses should be presented anonymously or connected to students.

10. Decide ahead of time whether the data produced during the questioning will be analyzed and compared.

11. Test the questions to determine their effectiveness.

12. Try to be creative in the use of the technology, and use the audience response systems when they are appropriate for the instructional activity. Do not force the lesson to fit the tool. (Premkumar & Coupal, 2008, pp. 147-149)

Premkumar and Coupal (DATE) advocated the use of audience response systems in other ways than just for quizzes and polls. For example, the researchers suggested the use of the technology to stimulate class discussions by posing controversial questions requiring critical thinking (p. 146).

Lincoln (2008) emphasized, "The ability of clickers to deliver desirable outcomes is mostly a function of how clickers are used, not whether or not they are used" (p. 39). Again, pedagogy was confirmed to be the most important element for designing and implementing effective instruction, rather than the tools used in the process. It is suggested that the advice given by Lincoln (2008) can be applied to all educational tools in addition to audience response systems: "Most challenges are only addressed when instructors carefully design course pedagogy and activities so that student use of clickers is a means to an end and not an end unto itself" (p. 45).

Pedagogical recommendations included allowing wait time for students to respond to questions and time for students to discuss the answers (p. 42). Peer instruction and cooperative group learning activities were recommended for instructional activities other than final quizzes or exams (p. 42). Lincoln (2008) introduced the concept of contingent teaching, explained as teaching that responds directly to students' needs (p. 42), and asserted that "instructors using clickers effectively are those subscribing to the contingent teaching style" (p. 42). Contingent teaching is made possible with the use of

clickers because students' responses and demonstration of understanding or lack of understanding of course content directs the teachers' actions and subsequent teaching and questioning.

In regard to the creation of questions to be used with audience response systems, Lincoln (2008) commented that it may be difficult to find high-quality questions in the commercially available banks of questions, and suggested that more cognitively advanced questions are more often created by the instructors (p. 42). He recommended that, when creating questions for use with the clickers, instructors should design them to respond to the content of the lesson, the types of cognitive processing students should be using, and the beliefs about learning they want students to internalize (Lincoln, 2008, p. 42). It was advised that instructors not use questions that only require memorization because these types of questions do not enhance cognitive processing and learning, and they do not promote discussion (Lincoln, 2008, p. 43). Sullivan (2009) stated, "Designing and developing effective clicker questions is what makes an instructor's use of clickers an effective teaching tool" (p. 338). It was also suggested that students could create questions to be used with audience response systems (Gentry, 2009). This activity may increase learning for the students creating the questions by requiring them to discuss and analyze content in order to develop questions, and it may also provide a bank of questions that are relevant and authentic to students because they are created by peers.

In addition to designing questions that promote discussion and critical thinking, instructors should use audience response systems in creative ways that may not involve traditional questioning. More unusual uses of audience response systems include data

collection in science classes (Henrickson, 2008), and replication of experiments in psychology classes in order to demonstrate behavioral phenomenon to students in an authentic way (Cleary, 2008). Other less typical uses of audience response systems include data collection in science classes (Henrickson, 2008), replication of experiments in psychology classes in order to demonstrate behavioral phenomenon to students in an authentic way (Cleary, 2008), and a legal trial simulation (O'Hanlon, 2007).

Audience Response Systems for Assessment

The use of audience response systems has been demonstrated in several studies to facilitate both formative and summative assessment (Kenwright, 2009; Premkumar & Coupal, 2008; Salemi, 2009; Skinner, 2009; Yourstone et al, 2008). Teachers can begin units or lessons by assessing students' prior knowledge with the audience response systems. Then, by occasionally asking questions at points during a lecture, students are given the opportunity to demonstrate their understanding of content and teachers are able to adjust instruction as necessary. They can skip over content that they determine students have already been mastered, and review content that appears to be problematic for students. Skinner (2009) commented that the use of audience response systems had as much effect on his own teaching as it did on student learning; he stated, "In some instances, my lesson plan for the day was completely altered when the majority of students responded incorrectly" (p. 23).

Premkumar and Coupal (2008) stated that formative assessment made immediately possible through the use of audience response systems may be beneficial to learners as well as instructors. Feedback provided to students about their answers

informs them about whether or not they understand the presented content (Coupal & Premkumar, 2008, p. 146). Salemi (2009) contended that using audience response systems is an effective way for teachers to check for understanding during a lecture (p. 391), and Yourstone et al (2008) confirmed that formative assessment is facilitated with the use of audience response systems because teachers can check for comprehension of the entire group at intervals during the lesson (p. 75).

In addition to checking for comprehension at intervals throughout at lecture and adjusting instruction in respond to students' feedback, Kenwright (2009) stated that audience response systems may be useful to assess students' prior knowledge before a lesson (p. 74). This can help instructors determine what material should be extensively taught and what should only be briefly reviewed or skipped altogether. In addition, when students' prior knowledge is tapped into, it may bring this knowledge into working memory where it can be reprocessed and integrated with new information. Although Kenwright (2009) discussed the concept of audience response systems tapping into students' prior knowledge in the context of college instructors finding out what content has already been covered in other classes, it is suggested that this tool may be especially useful for assessing prior knowledge of second language learners as well. Krashen (1981) emphasized the importance of accessing prior knowledge in order to make new information more comprehensible for second language learners, and audience response systems may facilitate accomplishing this because they allow all students to respond simultaneously and anonymously.

Another important aspect of instant and anonymous feedback is that students are able to compare their own knowledge and understanding of the content with other students, without fear of embarrassment. Kenwright (2009) remarked that, if students noticed that most other students understood the material while they did not, they may be motivated to study more; conversely, it may be a consolation to students to realize that the content they found difficult was difficult for other students as well (p. 74). Carnaghan and Webb (2007) reported that audience response systems facilitate summative assessment because the software that accompanies the systems allow for alignment with curriculum learning standards (p. 49).

The use of other instructional strategies such as cooperative learning work in combination with the use of audience response systems may enhance the potential for this tool to facilitate active processing and creation of constructivist learning environments (Barnes, 2008; Cohen et al, 2008; Lucas, 2009). Barnes (2008) contended that students were more actively engaged in course content while working in cooperative groups and using the response systems. Lucas (2009) also confirmed that students using clickers and participating in cooperative learning tend to learn more and develop more diverse solutions to problems because of the active participation and reflection involved in the process (p. 220).

Questions presented during instruction for the purpose of formative assessment also facilitate peer assessment by allowing "students to anonymously assess their peers" (Premkumar & Coupal, 2008, p. 146). Salemi (2009) advised that questions for use with peer instruction should "target higher-order cognitive outcomes" (p. 395) by following a

sequence of question, discussion, and the same question again. He also suggested that questions for peer instruction should not be graded, in order to remove barriers to student participation. It is suggested that the use of peer interaction may lower the Affective Filter; Hoekstra (2008) reported that the use of audience response systems reduced the anxiety experienced by students when new concepts were presented to them (p. 337). She stated, "whether working with the same peers or with different people each day, talking with others helps alleviate anxiety by allowing students to relate with others during the learning process" (Hoekstra, 2008, p. 338). She indicated that, even in extremely challenging courses such as chemistry, "Clicker-prompted peer interaction helps to minimize anxiety" (Hoekstra, 2008, p. 337).

Conclusion

Positive effects appear to be connected with the use of audience response systems as demonstrated in many research studies, including improved levels of engagement, motivation, participation, and satisfaction; improved academic achievement, lower levels of anxiety; enhancement of an egalitarian classroom environment in which all voices are heard; and convenient formative and summative assessment, indicating that this tool may contribute to a constructivist, authentic learning environment. The potential of audience response systems to serve the needs of second language learners by offering them the opportunity to express their thoughts and opinions and to demonstrate their knowledge and understanding in a non-verbal, non-threatening way, in addition to the lack of research on the use of this tool with English language learners, suggests that research in this area may be critical.

The present study explores the use of audience response systems with adult English language learners enrolled in a basic technology course taught in English, offered by an Oregon public school district. The study specifically investigates the perceptions of adult English language learning parents about the use of the audience response systems as tools to facilitate communication in an English-speaking classroom environment. It is suggested that this study provides implications for further research of audience response systems with K-12 English language learning students to explore the possible effects this tool may have on second language acquisition and retention of content taught in students' second language. Koenig (2010) stated that, with the use of audience response systems, "Interaction is now possible with the entire class and not just those in the first row" (p. 49). Although he was referring to native English-speaking students in large lecture classes, it is suggested that this statement may relate equally well to English language learners in English-speaking classroom environments. These tools may make it possible for previously overlooked and unheard students to have an equal voice with their native English-speaking peers, and to benefit more fully from their educational experiences.

This chapter presented a review of the literature focusing on: (a) English language learners in the United States (b) second language acquisition theory, (c) educational programs for English language learning adults, (d) the use of technology in the instruction of second language learners, (f) nonverbal response, and (g) audience response systems. While the literature reviewed here thoroughly explores the use of audience response systems and other forms of non-verbal response in educational

settings, a gap in the knowledge base still exists concerning the use of this tool and other forms of non-verbal response with adult English language learners.

A conceptual foundation of second language acquisition theory, emphasizing the importance of Comprehensible Input and the phenomenon of the Silent Period in the development of second language skills, suggests that the use of audience response systems may be well suited for the instruction of English language learners. This tool allows learners to respond to content presented in English without pressuring them to express themselves verbally in their second language before they are ready, a feature that may be extremely valuable to students and their instructors because it enables learners to demonstrate their understanding and opinions before they can verbalize them. Instructors may be able to assess understanding and adjust instruction to meet the needs of their students with accuracy they may not be capable of when only inferring or guessing at students' levels of understanding and knowledge.

The present study extends the existing knowledge base on audience response systems by investigating their use with adult English language learning parents. The focus of this chapter was an overview of English language learners in the United States, second language acquisition theory, programs for adult English language learners in English as a second language and other vocational content areas, the use of technology in the instruction of English language learners, and audience response systems as instructional tools. The following chapter presents a discussion of Q-Methodology as an appropriate methodology for exploring the use of audience response systems with adult English language learners and their perceptions about this technological instructional tool

to facilitate communication in English. The strategies used to recruit participants, collect and analyze data, ensure confidentiality, and maximize validity and reliability are described in detail. In order for this study to be replicated, this chapter describes in detail how this study was conducted.

Chapter 3: Research Method

The purpose of this study was to investigate the perceptions of adult English language learning parents of audience response systems and other forms of response, such as response cards, hand raising, hand gestures, and choral response, to facilitate communication in a predominantly English-speaking classroom environment. This chapter starts with a background on Q-methodology, followed by the research questions that guided this study, and a rationale for Q-methodology as the methodology chosen to conduct this study. The role and qualities of the researcher, the scope of the research setting, the participants, and a description of the selection procedures are provided. The procedures are described that ensure participant confidentiality and protect the ethical quality of this research, followed by an explanation of the research design, and strategies for data collection, analysis, and verification.

This chapter outlines the research design and data analysis that were used to investigate the following research questions:

1. What are English language learners' perceptions of audience response systems as tools to facilitate communication in a predominantly English-speaking classroom environment?
2. What are English language learners' perceptions of audience response systems as tools to facilitate English language acquisition and learning technology skills content?
3. What are English language learners' perceptions of audience response systems in comparison with other forms of verbal and nonverbal response?

A rationale for the use of Q-methodology as the research design for this study is presented, along with a description of the creation of the concourse, development of the Q-set of statements used in the study, selection of the P-set, "a structured sample of respondents who are theoretically relevant to the problem under consideration" (Van Exel & De Graaf, 2005), the Q-sorting process, and the data analysis procedures that were used.

The Research Setting and Population

The school district in which this study was held was in a central Oregon school district with approximately 4,656 students, located in the "urban fringe of a mid-size city" (Schooltree, 2008). The school district has a large English language learner population, or 64.1% of K-12 students compared with the national average of 17.9%. Fourteen percent of the population of Oregon is designated as English language learners (Oregon Department of Education, 2010). FAMU is part of the Migrant/Title I-C program and offers classes in English, technology, and courses toward earning General Educational Development certificates. Courses are offered in the evenings, four days a week, from 6:15 pm until 9:15 pm in the Academy of International Studies campus of the larger high school campus. The participants for this study were recruited from an adult education basic technology course offered to adult English language learners through the Family University program.

Participants were stakeholders in the K-12 school system, making their responses relevant to instructional practices and possible implications of this study to the district. Because participants were students in the adult education program, it was assumed that

all or most participants had at least basic understanding of the educational system, and at least minimal experience in a classroom environment. In order to increase content validity, all written instructions in regard to the study were provided to participants in Spanish and in English. The sample size for this study was relatively small, including 15 participants. This is a typical sample size for Q-methodological studies (McKeown & Thomas, 1988). Q-methodology allows objective, quantitative analysis of subjective, qualitative data, and enables the researcher to gain meaningful data and draw conclusions with a small sample size (McKeown & Thomas, 1988). Quiles (2009) stated that samples in studies employing Q-methodology are carefully selected rather than randomized, so that variability in a specific case or situation can be analyzed (p. 2). In this study, the P-sample was a group composed of learners with shared characteristics relevant to the research questions being explored: they were all be adult English language learners enrolled in a basic technology course taught primarily in English. This course employed the use of audience response systems in addition to other forms of verbal and nonverbal response in order for students to answer questions and express opinions.

This study was conducted from mid April through May 2010 from 6:30 pm to 9:15 pm. Participants had access to a computer and Internet connectivity while in class, and they were invited to use the computers with Internet access that are offered for free use in the district's local community college outreach locations. Participants were students enrolled in a basic technology skills course offered for free by their children's school district. They were instructed in basic computer operation and terminology, Windows organization, Microsoft Word basic skills, safe and responsible Internet use,

Internet searching, email and other social networking skills. They also learned how to use the audience response systems and other nonverbal response systems such as paper response cards, hand gestures, and choral response used to answer questions or express opinions nonverbally. The course instructor was a school district staff member teaching evening classes for parents in the Family University. The instructor did not have access to any of the data generated in the study.

Q-Methodology

Q-methodology is a quantitative research technique that measures and quantifies traditionally qualitative data such as perceptions and attitudes. Shinebourne and Adams (2007) described Q-methodology as an appropriate methodology for the investigation of opinions and beliefs. They contended that Q-methodology helps researchers identify similar and dissimilar points of view by simultaneously focusing on individual perceptions and revealing distinctive factors and patterns. Donner (2001) emphasized that Q-methodology "allows a researcher to explore a complex problem from a subject's point of view" (p. 24). The ability to measure subjectivity may provide a way to understand values and beliefs in a specific way that is not possible with strictly qualitative means.

Procedure

The procedure for conducting Q-methodology research involves the creation of a concourse of statements related to the central issue of an investigation. These statements are then narrowed down to a smaller set of statements, called the Q-sample, usually numbering between 20 and 40 statements that are most representative of the opinions

expressed by the population about the specific topic of study. The purposefully chosen participants, known as the P-sample, were given a set of statements that they were instructed to rank in order on a scale of -4 to +4 according to how little or how much the statements coincide with their own points of view. Contradicting Fisher's "pre-experimental equation of groups through randomization" (as cited by Campbell & Stanley, 1963), the P-set was chosen purposefully by considering the research questions and selecting participants that are theoretically saturated (Brown, 1992), with characteristics that cause the researcher to anticipate specific points of view. Following the rank ordering of the Q-sample statements, factor analysis was performed in order to identify patterns and commonalities; "By correlating people, Q factor analysis gives information about similarities and differences in viewpoint on a particular subject" (De Graff & Van Exel, 2005, p. 1).

Rationale for Q-Methodology

Q-methodology provides a study on the perceptions of people who have historically been denied a voice. Shinebourne and Adams (2007) contended, "Q-methodology is considered particularly suitable for researching the range and diversity of subjective understandings, beliefs, and experiences" (p. 104). They emphasized that this methodology is well suited to research questions that are designed to "hear many voices" (p. 104). Although the population of adult English language learning parents of K-12 students may be very large, the number of these parents enrolled in evening classes offered by the school district was substantially smaller. Q-Methodology has been identified as an approach that works well with small sample sizes, revealing intimate

details and specific viewpoints on subjectivity that may not be possible with a larger study (De Graff & Van Exel, 2005; Donner, 2001; McKeown & Thomas, 1988).

While a quasi-experimental study may be indicated for future research to determine whether audience response systems are more successful than other response methods for increasing engagement or improving performance, this methodology was not chosen for this study because the purpose of this study was exploratory in nature and focused on participants' perceptions rather than on quantitatively measurable data. Another reason that Q-methodology was chosen for this study was that the focus of this study is on the perceptions and opinions of adult English language learning parents about audience response systems, paper response cards, choral response, and speaking aloud in a predominantly English-speaking classroom environment. Q-methodology explores subjective points of view and, therefore, this methodology is well suited to exploring the perceptions and opinions of English language learners about the use of audience response systems to facilitate communication and learning in an English-speaking classroom environment. This application of Q-methodology to a relatively small sample of participants, selected because of common characteristics relevant to the research questions being explored, reveals correlations between participants and provided insights into their subjective perceptions.

Arguments Against Q-Methodology

Shinebourne and Adams (2007) stated that Q-methodology has been mistakenly identified as a quantitative design because of the "use of numerical data and statistical analysis" (p. 107) that it employs. They contended that factor analysis is necessary in the

case of Q-methodology to give meaning to the data, unlike other quantitative methods. They also emphasized the importance of allowing factors to emerge from the Q-sorts, rather than comparing Q-sorts with an "a priori constructed ideal Q-sort" (p. 107). McKeown and Thomas (1988) discussed another objection raised against Q-sorting as a research method: the complexity of the Q-sorting task because of the number of statements and categories participants must sort and make decisions about (p. 34). A researcher can control the complexity of the study by creating clear and concise statements and providing thorough instructions and demonstrations of how to do the Q-sorting activity. If participants are not native English speakers, explanations of the Q-sorting procedure and instructions on how to perform should be given in participants' native language.

Concourse Development

Concourse development involves the creation of a large set of statements that illustrate a range of attitudes and perceptions that have been expressed by people related to a particular subjective topic of exploration. Van Exel and De Graaf (2005) stated, "The gathered material represents existing opinions and arguments, things lay people, politicians, representative organizations, professionals, scientists have to say about the topic; this is the raw material for a Q" (p. 4). The statements in the concourse for this study were created by reviewing literature on second language acquisition, bilingual education, English language learners, and adult learners. In this way, a set of statements that are representative of the typical opinions expressed by adult English language learning parents about responding in classes taught in English were developed. The

statements in the concourse were collected from a variety of sources such as "direct quotes and themes from interviews with participants, statements originating from academic literature and popular media" (Shinebourne & Adams , 2007, p. 104). Fisher's principles of variance design (as cited by Preece, 1990), in which the statement are modeled or conceptualized theoretically" (Brown, 1980, p. 188), have been applied to create a 4 X 8 matrix (see Theoretical Design). This matrix identified 32 statements (4 constructs x 8 replications), representing the combinations of all the variables in the study.

Table 1
Theoretical Design

Effects	Levels	Elements
(W) Audience response system	(a) Affective filter (b) Other response systems	2
(Y) Second language acquisition	(c) Communication (d) Learning	2
(Z) Gender	(e) male (f) female	Categorical

Matrix 2 x 2 = 4 x 8 (replications) = 32 items

Interaction among the constructs is demonstrated as all possible combinations of main effects and replications, as shown in table 2.

Table 2
Interaction Among Constructs

a * c * e/f	b * c * e/f	a * b * e/f
a * d * e/f	b * d * e/f	c * d * e/f

Four constructs concerning the use of audience response systems were identified for this Q-methodological study, grounded in second language acquisition theory: communication, affective filter, other response methods in addition to audience response systems, and learning (See Table 3). These constructs directly relate to the research questions being explored in this study. Statements 1, 5, 9, 13, 17, 21, 25, and 29 explore perceptions about audience response systems to facilitate communication in English; statements 2, 6, 10, 14, 18, 22, 26, and 30 relate to the affective filter as described in second language acquisition theory; statements 3, 7, 11, 15, 19, 23, 27, and 31 explore the perceptions of participants of audience response systems in comparison to other forms of response; and statements 4, 8, 12, 16, 20, 24, 28, and 32 relate to participants' perceptions of audience response systems to facilitate learning of English and technology content taught in English.

The Q-samples in this study were quasi-naturalistic Q-samples drawn from literature on second language acquisition theory. Unstructured sampling was employed, choosing statements that are relevant specifically to audience response systems in relation to communication, learning, and the affective filter with a deductive design based on a

priori theoretical considerations based on second language acquisition theory (McKeown & Thomas, 1988).

Table 3
Q-Sample for Adult English Language Learners' Perceptions of Audience Response Systems

Communication	Affective Filter	Other response methods	Learning
1. Using clickers makes it easier for me to answer questions in class.	2. I feel comfortable answering questions in class with clickers.	3. I like using clickers more than raising my hand and speaking English in class.	4. Using clickers helps me learn technology skills and knowledge.
5. I like that everyone gets to answer questions at the same time by using the clickers.	6. I enjoy using clickers to answer questions in class.	7. I like using clickers more than using paper response cards to answer questions.	8. Using clickers helps me pay attention to the lesson.
9. My answers are more honest when using clickers than when having to speak.	10. I like that no one knows who got answers right or wrong when using clickers because its anonymous.	11. I like using clickers more than using hand signals to answer questions.	12. I enjoy using technology for learning.
13. When the teacher asks a question, I usually raise my hand.	14. Using clickers is easy for me.	15. I like using clickers more than answering aloud at the same time as everyone else.	16. Using clickers helps me learn English.
17. I enjoy discussing questions before and after answering them.	18. I feel comfortable using clickers to express my opinions in class.	19. I like using clickers more than writing answers to questions.	20. Seeing other peoples' answers to questions helps me learn.
21. I like being able to express my opinions anonymously with clickers.	22. Using clickers is fun.	23. Using clickers is easier than speaking to answer questions or express opinions.	24. Discussing questions after seeing graphs showing responses helps me learn.
25. I participate in class more when we use clickers.	26. I feel confident about my pronunciation in English.	27. I like speaking English in class.	28. Using clickers makes lessons more understandable.
29. Using clickers helps me understand other people's opinions better.	30. I understand how the English language works (grammar, syntax, and vocabulary).	31. I like speaking Spanish in class.	32. Using clickers helps me remember the things I learn.

Q-Sample Selection

The Q-sample is a selection of statements narrowed down from the original concourse. Although Van Exel and De Graaf (2005) conceded that there is no specific formula to follow in order to select the Q-sample from the larger concourse, they referred to the Q-sample as a "representative miniature of the concourse" (p. 5). A wide variety of statements from the concourse must be selected in order to create a Q-sample that is manageable, but is also representative of the same perceptions and attitudes that are expressed in the full range of statements in the concourse (Van Exel & De Graaf, 2005).

The concourse of statements for this study was originally a collection of many statements indicating possible perceptions about audience response systems in comparison with other forms of verbal and nonverbal responses in a predominantly English-speaking classroom environment in which technology knowledge and skills are form the course content. The final Q-sample was developed from this larger group of statements by forming the four constructs for the theoretical design, placing the statements into the four categories, and choosing the most representative statements for each construct to include in the Q-sort. A total of 32 statements comprise the Q-sample for this study, using eight replications for each construct (4 x 8 = 32).

P-Set Selection

Van Exel and De Graaf (2005) emphasized that Q-methodological studies do not require large sample sizes, only "enough subject to establish the existence of a factor for purposes of comparing one factor with another" (p. 6). They contended that the P-set is not selected intentionally by compiling a sample of "respondents who are theoretically

relevant to the problem under consideration" (p. 6). The P-Set, or Person Sample, selected for this study was chosen based on its unique characteristic as a group of English language learning adults who are parents of K-12 children, and who were also enrolled in an adult education course in basic technology skills. This P-Set represents the purpose of this study, examining the perceptions of adult English language learning parents about audience response systems and other forms of nonverbal responses as communication aides in classes where the content is taught primarily in English.

Participants in this study were not randomly chosen (Brown, 1980; McKeown & Thomas, 1988; Quiles, 2009; Webler et al, 2009). Instead, individuals were recruited who were representative of the issues and could provide the best insights on the topic under study. Webler, Danielson, and Tuler (2009) recommend a 1:3 ratio of participants to cards in a Q-sort and no lower than a 1:2 ratio. The present research design matrix is composed of 32 statements, therefore, using a pool of approximately 15-20 participants, the ratio would be between 1:2.1 or 1:1.6 respectively. Every effort was made to recruit the desired number of participants. The P-Set was expected to consist of approximately 20 native Spanish-speaking students, in a group composed of both male and female adult parents of K-12 English language learners.

Data Collection Procedures

I distributed invitations to participate in the study and letters of informed consent, written in English and Spanish, after explaining the study to participants. The study was explained in Spanish, and potential participants were given time to ask questions and receive clarification on any aspects of the study. In order to give participants time to

think about the study and decide without any pressure whether they would like to participate in it, they were invited to bring back the letters of consent to the following class two days later if they decided to participate. I explained that participation in this study was voluntary, and that there was no differentiation of treatment between students who participated in the study and those that did not. Participants were informed that they could withdraw from the study at any time. Privacy and safety of participants was protected by keeping all data confidential and coding demographic, academic, and research data so that names were separated from all other data. No monetary compensation was offered for participation in this study, so participants did not feel any financial pressure. All participants were already be enrolled in free classes offered by the school district's Family University, so no financial demands were made of them.

All students enrolled in the course received the same educational experience and given the opportunity to develop the same technology skills and knowledge. Those students who chose not to participate were instructed not complete the Q-sorting procedure during the last class in the course. Students' names or any other identifiable information were not be connected with any data collected in the study. Permission to conduct this study was requested of Walden University's Institutional Review Board.

Q-Sorting Process

Van Exel and De Graaf (2005) explained that the cards comprising the Q-sample are given to participants in a pack of randomly numbered cards with one statement written on each one (p. 6). Participants are instructed to rank the cards, usually on a scale of -4 to +4, with -4 being the most unlike their personal point of view, 0 being neutral,

and +4 being the most like the point of view that they most identify with. It was recommended that Q-sorts be followed with interviews to provide participants the opportunity to elaborate on their points of view, especially in regard to the extreme ends of the spectrum, those most unlike and those most closely aligned the participants' points of view (p. 7).

Most commonly, Q-sorts are conducted using paper cards that participants place in order, often in a face-to-face environment with the researcher. They can be completed individually using Q-sorting materials they receive in the mail from the researcher. Another way to conduct a Q-sorting procedure is by using a free Internet-based program such as WebQSort (Correa, 2004), allowing participants to do their statement sorting online. Participants in this study were enrolled in a course to help them develop technology skills and knowledge; therefore, an electronic Q-sorting environment was argued to be the most appropriate one for this particular sample and study.

Q Sorting Instructions

The basic concept of Q-sorting and instructions on how to perform a Q-sort were explained to students in Spanish in order to ensure that the content was fully understood. They were provided written Conditions of Instruction, in English and in Spanish. Participants were presented with 32 statements forming the Q-sample. They were instructed to sort these statements from a range of -4 to +4 indicating how little or how much they agreed with the statements relating to how they felt about using audience response systems compared to other forms of response in the classroom environment. Statements that participants felt neutral about were placed in the zero column, while those

statements they most strongly identified with were placed in the positive number columns, and those they did not identify with were placed into the negative number columns. (See Table 4).

Table 4
Q-Sorting Guide

Agree very little				Neutral			Agree very much	
-4	**-3**	**-2**	**-1**	**0**	**+1**	**+2**	**+3**	**+4**
2	**3**	**4**	**4**	**6**	**4**	**4**	**3**	**2**

Numbers under each range indicate the forced choice numbers of items to be placed in that section of the guide. The guide represents a quasi-normal distribution of scores. McKeown and Thomas (1988) addressed criticism of Q-methodology because of the complexity of the Q-sorting activity as being possibly "beyond the cognitive ability of most people" (p. 34). This issue may be especially relevant in the context of English language learners, with varying amounts of experience with institutionalized education and levels of English language proficiency, taking a technology course taught in English. This study employed a forced-free design in which participants were free to place statements wherever they wish, but had to distribute a specific number of statements into each possible ranking. Quiles (2009) contended that using a forced-free sort condition may provide structure to the Q-sorting activity that may make the task less overwhelming to participants (p. 6).

Role of the Researcher

The researcher was an unpaid, independent observer in this noncredit, basic technology class for adult English language learners. The researcher explained the study to potential participants and distributed letters of consent at the conclusion of the course. The letters of consent were collected from willing participants before conducting the Q-sorting activity. The researcher is an elementary school computer skills teacher within the school district, and there was a small chance that one or more participants in the study may have been parents of the researcher's former or present students. If this was the case, it was unlikely that the researcher or the participants were aware of it.

Data Analysis Procedures

As suggested by Van Exel and De Graaf (2005), a correlation of all the Q-sorts was calculated, representing the level of agreement or disagreement between individual Q-sorts, illustrating the differences in points of view among individual participants (p. 8). Once a correlation matrix was created, factor analysis was conducted to identify commonalities and patterns in clusters of factors that were heavily loaded and factors that were shown to be insignificant to a large number of participants. Every Q-sort had a factor loading determined to demonstrate how much each Q-sort is positively related to each factor. Following this step in the procedure, factor rotation was conducted in order to determine a final set of factors by examining the collection of opinions "from different angles" (De Graaf & Van Exel, 2005, p. 9). Finally, the factor scores and difference scores were calculated in order to see how different factors were loaded to different extents. A distinctive statement is identified when a statement's scores are identified as

exceeding the difference score. Those statements that are not significant as exceeding the difference score are identified as "consensus statements" (p. 10). Participants were invited to submit written comments about the audience response systems after the Q-sorting activity so that they could have the opportunity to elaborate on their rankings and choices and to verify the data collected during this study.

In regard to reliability, Quiles (2009) stated that Q-methodological studies are "less concerned with the ability to generalize the findings from the analysis and uses smaller, well-selected samples to analyze variability within cases" (p. 2). He cautioned that Q-methodology should not be confused with R-method factoring techniques, a common tendency that leads to misunderstandings about what factors are being analyzed. In Q-methodology, people are factored, and their points of view are analyzed to identify clusters of commonalities in subjective perceptions. Van Exel and De Graaf (2005) addressed criticism of Q-methodology for its weakness in regard to reliability and possibility of generalizations. They reported that "the most important type of reliability for Q is replicability: will the same condition of instruction lead to factors that are schematically reliable – that is, represent similar viewpoints on the topic – across similarly structured yet different Q samples and when administered to different sets of persons" (p. 3). Therefore, greater reliability may be achieved in this study by repeating it with another group of adult English language learners enrolled in future sessions of the same basic technology course. Statistical reliability and the ability to generalize results to the larger population, however, was minimized by Van Exel and De Graaf (2005) in importance because it is "the distinct subjectivities about a topic that are operant, not the

percentage of the sample (or the general population) that adheres to any of them" (p. 3). To ensure content validity in regard to second language acquisition theory, Q-sort items were reviewed by a university professor who is also a Bilingual Teaching and Learning Coordinator. As Quiles (2009) recommended, statements were "written in a language familiar to the sample of participants under investigation" (p. 5). Therefore, all statements were written in Spanish, because all participants were native Spanish speakers.

Brown (1996) observed, "Some of the quantitative obstacles to the wider use of Q methodology have recently been rendered less daunting by virtue of software packages which have converted to button presses what before were tedious calculations" (p. 1). Data analysis on the results of this study were conducted using a free statistical program entitled PQMethod (Schmolk, 2002), allowing the researcher to enter the data and then "compute intercorrelations among Q-Sorts, which were then factor-analyzed and rotated in order to view participants' perceptions and the connections between them from different points of view (Brown, 1991). Factor rotation illuminated significant common perceptions and relationships that may not be have been evident in the raw data and the initial factor loadings (Brown, 1991). Following analysis of factor loadings and factor rotation, the PQMethod program created reports that included tables showing "tables on factor loadings, statement factor scores, discriminating statements for each of the factors, as well as consensus statements across factors" (Schmolck, 2010). Determinate varimax rotation of the resultant factors was examined.

Summary

This chapter described the use of Q-methodology to explore the perceptions of adult English language learners of audience response systems as communication aides in a technology course taught primarily in English. Results of this study may influence instruction and assessment practices in adult education classes for English language learners. Rationale for the use of Q-methodology, an ipsative measurement approach, in a study focusing on subjective opinions was provided, and the structure and procedures of the methodology were explained. The results of this study are explained and discussed in chapter 4, and conclusions drawn about these results are discussed in chapter 5.

Chapter 4: Results

The purpose of this study was to answer the following research questions:

1. What are English language learners' perceptions of audience response systems as tools to facilitate communication in a predominantly English-speaking classroom environment?

2. What are English language learners' perceptions of audience response systems as tools to facilitate English language acquisition and learning technology skills content?

3. What are English language learners' perceptions of audience response systems in comparison with other forms of verbal and nonverbal response?

Q-methodology was utilized in this study explore subjective points of view and perceptions of adult English language learners about the use of audience response systems to facilitate communication and learning in an English-speaking classroom environment. A small sample of participants was selected because of common characteristics that were relevant to the research questions being explored. A correlation matrix was developed, factors were identified and analyzed, and factor scores were examined in the process of statistical analysis. Quiles (2009) remarked that perceptions and various points of view are difficult to study and measure with precision because they are subjective, but that factor analysis enables researchers to reveal theoretical frames in an empirical way. McKeown and Thomas (1988) explained that factor analysis helps researchers interpret results by reducing the perceptions of a group of participants about subjective issues to a few common typologies. Typologies given by Quiles (2009) as

possible examples were organizations and behavioral patterns. This study was designed to discover a typology of adult English language learners using technology in educational environments. The correlation and factor analysis conducted using the PQMethod program (Schmolck, 2002) and the factors revealed in this study are discussed in this chapter.

Participants were given the choice of completing the Q-sorting activity in English or Spanish. Eleven people completed the activity in Spanish, and four people completed it in English. Two factors emerged from the data analysis of the English Q-sorting activity, and three factors emerged from the Spanish Q-sorting activity. In addition to the first two factors that were identical to the English Q-sorting activity, a third factor emerged in the Spanish Q-sorting activity. Profiles of the subgroups in each Q-sorting activity were derived from the factor Q-sort values, normalized factor scores, and distinguishing characteristics for each factor (Donner, 2001). Each emergent factor is identified and discussed in this chapter, and correlation of the factor analysis is provided. Participants' comments provided additional insights into their feelings and opinions about using the audience response systems. This chapter concludes with a summary of the results of this research.

Demographic Information

Data for this research study were gathered from 15 adult English language learners enrolled in a basic technology course offered by the FAMU, part of the Migrant/Title I-C program of a school district in the "urban fringe of a mid-size city" (Schooltree, 2008, p. 1). The school district has a large English language learner

population, or 64.1% of K-12 students compared with the national average of 17.9%. The participants in this study were all parents of English language learning children enrolled in the school district.

Participants were asked about their English language proficiency and level of expertise with technology. Because the participants were students in the adult education program, it was assumed that all or most participants had at least basic understanding of the educational system, and at least minimal experience in a classroom environment. In addition, it was assumed that adults enrolled in a basic technology class would have low levels of expertise in technology, but high levels of literacy in their native language. Because of the assumption of high literacy levels in participants' native language, all written instructions were provided to participants in Spanish as well as English in order to increase content validity. The assumption of high literacy levels in Spanish was shown in the study to be unsubstantiated, possibly weakening the validity of the study. Many of the participants had difficulty reading the statements, even when they selected the Q-sorting activity with statements written in Spanish. In-class activities and the Q-sorting activity revealed that the majority of participants had low levels of literacy in Spanish, as well as low levels of English language proficiency and low levels of technology expertise. This discrepancy in expectations may have been detrimental to the collection of valid data because many participants expressed confusion and frustration with the Q-sorting activity and needed help reading the statements.

The Q-sorting activity was new to the participants, and this may have overwhelmed some of them because of their limited experience with technology and

computers. Q-methodology is an ipsative approach because participants must consider each statement in comparison to the other statements, rather than responding to each statement independently of the others. This caused some difficulty because many participants did not want to rank some of the statements in the negative columns, as required in the forced distribution pattern of the Q-sort. They expressed the thought that the negative columns meant that they completely disagreed with the statement, rather than being a comparison with other statements in order to create a ranking, and they did not disagree with the number of negative column statements required.

Although the sample size for this study was expected to be between 15 and 20, only 15 people participated. This was attributed to attrition from the course, as all students still attending at the end of the course participated. However, according to McKeown and Thomas (1988), 15 participants are sufficient as a sample size for Q-methodological studies. McKeown and Thomas (1988) contended that Q-methodology allows objective, quantitative analysis of subjective, qualitative data, and enables the researcher to gain meaningful data and draw conclusions with a small sample size. Quiles (2009) stated that samples in studies employing Q-methodology are carefully selected rather than randomized, so that variability in a specific case or situation can be analyzed (p. 2).

As explained in the procedures section of chapter 3, data were gathered from 15 adult English language learners enrolled in a basic technology course in the free family university program of the school district where their children are enrolled. Ten of the participants were female (66%) and five were male (33%). Participants indicated their

levels of English language proficiency and expertise with technology. They also expressed their preferred method of responding to questions and expressing their opinions in class. Literacy levels, English proficiency levels, and technological skills were also estimated by noting which Q-sorting activity participants chose to perform, observing behaviors, and listening to comments made during the activity. Two of the participants (13%) had advanced English language proficiency, six (40%) were at the intermediate level, and seven (47%) were at the emergent level of proficiency. In regard to technology, one participant (7%) was advanced, four (27%) were intermediate and 10 (66%) were beginners. Eleven participants chose to do the Q-sorting activity in Spanish, and the remaining four (27%) did the activity in English. Clickers were chosen as the preferred response method by 10 of the participants (66%), one participant (7%) preferred hand signals, and the remaining four did not respond to this question (see Table 5).

Table 5
Demographic Characteristics of Participants

Variable	F	% (N=15)
Gender		
	Male: 5	33%
	Female: 10	66%
English language proficiency		
	Advanced: 2	13%
	Intermediate: 6	40%
	Emergent: 7	47%
Technology proficiency		
	Advanced: 1	7%
	Intermediate: 4	27%
	Beginning: 10	66%
Chosen language for Q-sort Activity:	Spanish: 11	73%
	English: 4	27%
Preferred response method		
	Clickers: 10	66%
	Hand signals: 1	7%
	Other: 4	27%
"Using clickers helped me express my ideas in a class where content was in English".	Strongly agree: 1	7%
	Agree: 1	7%
	Neutral: 5	33%
	Disagree: 2	13%
	Strongly disagree: 2	13%
	No response: 4	7%

This study was conducted from mid April through May 2010 from 6:30 pm to 9:15 pm. Participants had access to a computer and Internet connectivity while in class, and they were invited to use the computers with Internet access that are offered for free use in the district's local community college outreach locations. They were students

enrolled in a basic technology skills course taught by a district staff member, offered free of cost through their children's school district. They used the audience response systems and other nonverbal response systems such as paper response cards, hand gestures, and choral response to answer questions or express opinions nonverbally.

Technical Difficulties

Several problems occurred with the WebQSort (Correa, 2007) program, the Internet-based computer program used for performing the Q-sorting activity, which hindered the collection of data. Presort and postsort questions appeared and functioned properly for some participants, while the questions did not appear for other participants. Hard copies of these questions were printed out and participants were asked to write their responses on them. Although the data were available and retrieved after the activity, the data remained inaccessible on the WebQSort website. The website for WebQSort is not functioning properly. For example, researchers are unable to log in, and clicking on the link to see an example sort produced an error message. Fortunately, the data were saved at the time it was generated, and data analysis was possible. The author of the WebQSort program was emailed about the problems with the website, but did not reply. The problems with the Internet-based Q-sorting program and the inability to contact the author or to have the problems resolved suggest that caution should be taken by other researchers not to rely completely on technology, even when the research is being done in the field of educational technology. Alternative plans must be made in case of technical difficulties, and backup copies of all data should be created as soon as it is generated.

Another technical problem related to this study was the PQMethod computer program (Schmolck, 2002) that was utilized for data analysis. The PQMethod program was recommended because it is customized for use with Q-analysis, and the results it produces are easier to interpret than those produced by other statistical software programs such as SPSS (Webler, et al, 2009). It is also a free program, as opposed to other data analysis programs designed for use with Q-methodology that are expensive. However, the most recent release of the program was in 2002, and it is not compatible with current versions of Windows. Although running a compatibility troubleshooter made it possible to use the PQMethod program for this study, the component of the program for running the varimax rotation would not function, so the older program that displayed data as whole numbers rather than decimals was utilized. Increasing interest in Q-methodology should motivate researchers with programming expertise to update the existing programs or create new versions of free data analysis programs designed for Q-methodology that will function properly on current computers.

Data Analysis

Quiles (2009) identified the goal of Q-factor analysis as the identification of factors that "are a composite of individuals who significantly load on one factor and no other factors" (p. 4) in order to develop a hypothetical prototype that may be useful for exploring human subjectivity and "designing intervention strategies for dealing with professional personnel's issue of concern" (p. 8). Donner (2001) identified three outputs for analysis and discussion in Q-methodological studies: distinct groups of common perspectives, items of contention showing the difference between subgroups'

perspectives, and items of consensus showing perspectives that subgroups have in common. The existence of consensus items as well as contention items makes Q-analysis orthogonal rather than bipolar. McKeown and Thomas (1988) explained that bipolarity would mean that there would be no overlap of perceptions because perceptions would be shown as mirror images. If a participant agreed with a particular item, in the context of bipolarity, they could not agree on any items that contradicted it. In the real world, with real people, there are shades of gray. Human perceptions are not shown as "polar opposites, but independent (orthogonal) structures with differing criteria referents" (McKeown & Thomas, 1988, p. 73). A bipolar structural relationship is too limiting when exploring human subjectivity because perceptions have "areas of consensus as well as cleavage" (McKeown & Thomas, 1988, p. 74). Therefore, Q-analysis is conducted in the context of orthogonal structural relationships.

Donner (2001) identified the three procedures comprising Q-analysis as identification of correlations between different participants' sorts, extraction of initial factors, and rotation of factors to identify distinct patterns and develop typologies. Six steps were outlined for use with the PQMethod (Schmolck, 2002) computer program: loading and launching the program, entering the statements for sorting and the data produced by the Q-sorting activity, extracting the initial factors in a correlation matrix, rotating the factors, and grouping participants into subgroups that define the main factors or typologies.

Statements Sorting Matrix

Tables 6 and 7 show each participant's rankings of each statement in the sort on a scale of -4 to +4. The numbers in parenthesis show the number of statements required to be placed in each ranking position by the forced-sort conditions of instruction.

Table 6
English Q-Sort Responses (n=4)

Sorter	-4 (2)	-3 (2)	-2 (4)	-1 (5)	0 (6)	1 (5)	2 (4)	3 (2)	4 (2)
20003	2, 22	14, 19	8, 9, 12, 23	13, 15, 17, 21, 26	4, 11, 20, 28, 29, 32	1, 3, 24, 30, 31	5, 7, 25, 27	6, 18	10, 16
50015	9, 22	7, 27	3, 19, 23, 29	2, 5, 6, 24, 28	4, 16, 18, 21, 26, 30	12, 14, 20, 25, 32	8, 10, 17, 31	11, 13	1, 15
92200	28, 32	5, 24	7, 17, 21, 29	13, 18, 19, 26, 30	4, 8, 11, 20, 22, 31	3, 6, 9, 14, 25	1, 2, 10, 16	12, 27	15, 23
74956	25, 31	3, 18	21, 26, 28, 29	5, 6, 8, 17, 30	1, 4, 11, 12, 22, 31	7, 10, 13, 16, 27	2, 14, 19, 20	9, 23	15, 25

Table 7
Spanish Q-Sort Responses (n=11)

Sorter	-4 (2)	-3 (2)	-2 (4)	-1 (5)	0 (6)	1 (5)	2 (4)	3 (2)	4 (2)
58490	2, 27	7, 20	6, 12, 16, 29	1, 3, 10, 22, 23	8, 14, 26, 28, 31, 32	5, 13, 21, 24	9, 15, 19, 25	4, 11	17, 18
27740	10, 22	7, 20	2, 8, 9, 28	1, 21, 24, 27, 30	17, 18, 19, 26, 29, 31	3, 4, 6, 14, 25	5, 13, 15, 32	11, 23	12, 16
75966	10, 13	7, 19	1, 2, 27, 29,	9, 12, 14, 16, 20	4, 5, 11, 17, 22, 25	3, 15, 21, 24, 30	6, 8, 28, 31	26, 32	18, 23
11467	12, 14	11, 15	7, 16, 21, 29	5, 8, 13, 22, 23	2, 4, 10, 25, 26, 28	6, 18, 19, 24, 31	9, 17, 30, 32	1, 3	20, 27
80180	8, 21	12, 29	16, 22, 26, 32	2, 3, 14, 20, 24	4, 5, 7, 17, 23, 31	1, 6, 10, 13, 15	9, 19, 25, 30	27, 28	11, 18
34612	14, 18	19, 24	7, 12, 16, 28	3, 11, 26, 29	6, 13, 21, 23, 25, 30	5, 9, 10, 27, 31	1, 4, 8, 12	8, 22	2, 20
Sorter	-4 (2)	-3 (2)	-2 (4)	-1 (5)	0 (6)	1 (5)	2 (4)	3 (2)	4 (2)
64454	15, 19	3, 31	16, 18, 22, 25	4, 10, 23, 24, 28	6, 9, 13, 14, 20, 29	7, 11, 17, 27, 32	1, 5, 8, 12	21, 26	2, 30
67121	8, 29	7, 12	14, 16, 22, 25	1, 2, 11, 19, 27	4, 5, 13, 21, 28, 31	9, 10, 17, 18, 23	3, 20, 24, 30	6, 26	15, 32
15055	8, 16	10, 30	3, 12, 20, 23	9, 11, 14, 15, 21	8, 13, 25, 29, 31, 32	1, 2, 5, 22, 26	4, 17, 19, 27	6, 24	4, 23
50059	12, 29	11, 16	7, 13, 15, 21	9, 10, 22, 25, 26	3, 8, 14, 17, 19, 28	5, 24, 27, 30, 31	1, 2, 6, 32	18, 20	4, 23
72909	8, 11	7, 12	1, 15, 22, 29	2, 4, 9, 27, 32	10, 13, 14, 16, 19, 25	3, 6, 20, 21, 26	17, 23, 30, 31	18, 28	5, 24

McKeown and Thomas (1988) defined three sets of statistical procedures for analyzing data from Q-sorting activities: correlation, factor analysis, and computation of factor scores. A correlation matrix is first created in order to illustrate the level of agreement or disagreement between individual sorts (Van Exel & De Graaf, 2005). The correlation matrices formed from the Q-sorts demonstrate how much individual sorts agree or disagree with one another (Van Exel & De Graaf, 2005). Factor loadings, also called correlation coefficients, show the extent to which each Q-sort is in agreement or disagreement with a hypothetical model Q-sort (McKeown & Thomas, 1988). The PQMethod program produces tables of eigenvalues for the sorts to show a factor's level of significance or importance when the researcher runs the QPCA routine. Eigenvalues are "a measure of the relative contribution of a factor to the explanation of the total variance in the correlation matrix" (Donner, 2001, p. 31). Donner explained that these correlations enable the researcher to produce the "raw building blocks for the next step" (p. 31) in factor analysis. Factors with eigenvalues greater than 1.00 are considered significant, and those with eigenvalues less than 1.00 are "considered too weak to warrant serious attention (McKeown & Thomas, 1988, p. 51). The process of running the QPCA routine and creating the table of factors with eigenvalues helps the researcher narrow the factors down to the most representational and relevant ones to use for further data analysis. Donner warned that eigenvalues should not be the only criteria for deciding how many factors to analyze because the more factors there are, the more fragmented the data will be. The Q-sorts in this study were run with the suggested number of seven

factors, and then reduced to only two factors in the English Q-sort and three factors in the Spanish Q-sort for final data analysis.

In order to extract the initial factors that permit grouping of individuals into subgroups that have similar response patterns, the Q-sorts of the participants were correlated and matrices created. Because participants opened the WebQSort program on separate links for English and Spanish sorts, the data were divided between Q-sorts performed in English and those done in Spanish. Tables 8 and 9 show the correlation matrix for the participants that performed the English Q-Sort and those that performed the Spanish Q-sort, respectively. A score of 100 shows the correlations of a participant to himself or herself; thus 100 is a perfect correlation. The higher the positive numbers are, the more two participants agree with one another, while negative numbers show the extent to which participants have opposing points of view.

Table 8
English Q-Sort Correlation Matrix

Participants	20003	50015	92200	74956
20003	100	11	-6	-23
50015	11	100	-13	-2
92200	-6	-13	100	58
74956	-23	-2	58	100

Table 9
Spanish Q-Sort Correlation Matrix

Part.	58490	27740	57966	11467	80180	34612	64454	67121	15055	50059	72909
58490	100	23	30	-7	35	-20	-24	25	23	4	23
27740	23	100	23	-38	-1	-37	-13	7	-13	-15	1
57966	30	23	100	7	-6	-13	-4	44	15	39	38
11467	-7	-38	7	100	30	30	-1	44	26	59	35
80180	35	-1	-6	30	100	-16	-26	23	40	23	19
34612	-20	-37	-13	30	-16	100	23	6	-19	25	-23
64454	-24	-13	-4	-1	-26	23	100	-11	-12	0	-13
67121	25	7	44	44	23	6	-11	100	18	42	49
15055	23	-13	15	26	40	-19	-12	18	100	34	37
50059	4	-15	39	59	23	25	0	42	34	100	44
72909	23	1	38	35	19	-23	-13	49	37	44	100

By choosing to use a forced-sort, the researcher "influences the statistical distribution of total items" (Quiles, 2009, p.6). Because participants must put fewer items in the extreme top and bottom ends of the scale, a normal distribution is created by the sort and data are more easily analyzed. Although the structure provided by making the task a forced-sort was explained as a benefit to make the task less overwhelming, in the case of this study, it may have confounded the participants because of lack of experience with surveys and ranking activities, low literacy levels, and lack of experience with technology. Participants expressed dissatisfaction with being forced to place items

in the negative columns when they did not completely disagree with the statements. Instead of understanding the scale as a way to rank the statements relative to one another, many people had preconceived ideas of negative numbers as bad or opposite to how they feel.

The PQMethod (Schmolck, 2002) computer program calculated the correlation matrices from the English and Spanish Q-sorts, demonstrating correlations between the sorts within a range of -1 (disagreement) to +1 (agreement). A correlation of 0 indicated no relationship between the sorts. Because this study utilized a forced distribution format, the mean, standard deviation, and standard error of the mean were identical for all sorts. Reliability significance of factor loadings in Q-analysis depends on the number of items in the Q-sample. In order to calculate the standard error (SE) of the factor loadings in this study, the formula $1/\sqrt{N}$ was used, N representing the number of items in the Q-sample. Because the Q-sample in this study had 32 statements, the standard error of the factor loadings equaled 0.18 (square root of 32 divided by 1 equals 17.66, rounded to 18). For a factor loading to be significant at the *alpha*.01 level, it had to be above 2.58(SE). With the standard error equaling 0.18, the loading had to be above 0.46. For the *alpha*.05 level of significance, the loadings had to surpass 0.35. Quiles (2009) explained that these values are appropriate for reaching a reliability coefficient when the score is between 2 and 2.5 times the standard error in a Q-methodology study. Tables 10 and 11show the English Q-sort and Spanish Q-sort correlation matrices and the unrotated factor matrices used to determine which factors to include in further analysis based on the eigenvalues in excess of 1.00.

Table 10
Unrotated Factor Matrix (English Q-Sort)

SORTS	F1	F2	F3	F4
20003	-0.3799	0.6377	0.6622	0.1029
50015	0.0704	0.8073	-0.5799	0.0838
92200	0.8437	0.2679	0.1959	-0.4220
74956	0.8855	-0.0459	0.1436	0.4395
Eigenvalues	1.6452	1.1323	0.8337	0.3888
% expl.Var.	41	28	21	10

Table 11
Unrotated Factor Matrix (Spanish Q-Sort)

SORTS	F1	F2	F3	F4	F5	F6	F7	F8
58490	0.4091	0.5386	-0.0840	-0.3082	0.5004	0.2588	0.2348	-0.1601
27740	-0.0497	-0.7030	0.3502	-0.1373	0.0089	0.4011	0.3372	0.0137
75966	0.5313	-0.2448	0.6303	0.0410	0.0734	-0.2727	0.1688	0.0330
11467	0.6239	0.5848	0.1308	-0.0959	0.1379	0.1885	-0.0366	-0.0518
80018	0.5112	-0.1619	-0.6276	-0.1855	0.2181	0.3360	0.0979	-0.0786
34612	-0.0693	0.7444	0.1358	-0.4558	0.2188	-0.1619	0.1033	0.0657
64454	-0.2412	0.4108	0.3563	0.4268	0.5858	0.3222	-0.1201	-0.0342
67121	0.7210	0.0246	0.3144	-0.2614	-0.0610	0.2256	-0.2726	0.3889
15055	0.5872	-0.0642	-0.4075	0.4620	0.1798	-0.1999	0.2201	0.3373
50059	0.7270	0.3883	0.1652	0.0166	-0.0118	-0.0201	0.3823	-0.2547
72909	0.7382	-0.1060	0.1452	0.3096	-0.2239	0.0232	-0.3205	-0.2381
Eigenvalues	3.1038	2.1021	1.3967	0.9270	0.7998	0.6724	0.6050	0.4278
% expl.Var.	28	19	13	8	7	6	5	4

When this study was designed, four constructs grounded in second language acquisition theory were initially chosen to categorize the statements. These four constructs are communication, affective filter, other response methods, and learning. The actual implementation of the Q-sorting activity with participants revealed factors that are related to these constructs. Tables 12 and 13 show the factor loadings of the English and

Spanish Q-sorts with only the chosen factors included. There were two emergent factors in the English Q-sort, and three factors revealed in the Spanish Q-sort.

Usually, in a Q-methodology study, there should be at least three sorts that significantly load on each of the factors selected for analysis. However, because the sorts were separated into English Q-sorts and Spanish Q-sorts, and the English Q-sort included only four participants, two pure significant sorts supported the selection of the two factors analyzed in the English Q-sort.

Table 12
Factor Matrix with an X Indicating a Defining Sort (English Q-Sort)

Q-sort.	Factor 1	Factor 2
20003	-0.2724	0.6904X
50015	0.1993	0.7855X
92200	0.8758X	0.1287
74956	0.8666X	-0.1877
% expl.Var.	41	29

Total model variance 70%

Note: Factors 1 and 2 are significant at $p < .01$, with pure loadings defining each factor

Although three factors emerged in the Spanish Q-sort, factor two appears to define an ambivalent point of view shown by participants that loaded significantly on this factor, as shown in Table 13. There is overlapping of significant loadings on factors 1 and 2 in the case of participants #11467 (F1 .4646 at p<.01 and F2 .6926 at p<.01) and #50059 (F1 .7083 at p<.05 and F2 at p<.05 .4358), and on factors 2 and 3 with participants #58490 (-.4116 at p< .05 and .4668 at p<.01) and #34612 at .6458 at p< .01 and -.3983 at p< .05). These confounding qualities illustrate why analysis in Q-methodology is orthogonal rather than bipolar. According to McKeown and Thomas

(1988), bipolarity would indicate an absence of overlapping perceptions, but human perceptions are often blends of viewpoints from opposite spectrums. This study demonstrates the orthogonal nature of human perceptions with the dual loadings with factors 1 and 2 and factors 2 and 3 with the Spanish Q-sort.

Table 13
Factor Matrix with an X Indicating a Defining Sort (Spanish Q-sort)

QSort	F1	F2	F3
58490	0.2777	-0.4116**	0.4668X
27740	0.1311	-0.7739X	-0.0559
75966	0.7836X	-0.3317	-0.1240
11467	0.4646*	0.6926X	0.2299
80018	0.0732	0.1234	0.8129X
34612	0.0400	0.6458X	-0.3983**
64454	0.0089	0.2374	-0.5454X
67121	0.7748X	0.0483	0.1286
15055	0.2613	0.1611	0.6487X
50059	0.7083X	0.4358**	0.1223
72909	0.6916X	-0.0201	0.3140
Defining Sorts	4	3	4
% expl.Var.	23	19	18

Total Model Variance: 60%

Note. Significant loadings at ** p< .05 and *X p< .01

Factor Rotation

After initial factors were revealed in the correlation matrices, factor rotation was performed. McKeown and Thomas (1988) explained that the reason behind all rotational methods is the "statistical quest for simple structure" (p. 52). The researcher's purpose is to identify as many Q-sorts as possible that load on the same factor, with the Q-sorts loading one only one factor and neglecting all other factors being the desired outcome. McKeown and Thomas (1988) explained, "What rotation effects is a change in the vantage point from which data are viewed" (p. 52). This explanation is in line with

Brown's allegory of factor rotation as the viewing of a billboard from different points of view: the information does not change, but insights may be gained and information noticed by looking at the data from different perspectives. Van Exel and De Graaf, (2005) concurred, "Rotation does not affect the consistency in sentiment throughout individual Q-sorts or the relationships between Q-sorts, it only shifts the perspective from which they are observed" (p. 9).

Two forms of rotation are used for Q-analysis: objective (varimax) or theoretical (judgmental). Judgmental rotation is guided by preconceived ideas about the participants or the sort. Varimax rotation is suggested for use, especially for Q-methodology novices (Donner, 2001), as the analysis is less complex, but the results are usually the same as those produced with judgmental rotation. Therefore, varimax rotation with Kaiser normalization was chosen for use in this study.

Factor Analysis

Analysis of Q-sorts leads to the creation of idealized factors that represent many different participants' viewpoints as a single composite whole. The factors are referred to as idealized factors because "they are produced by analysis, rather than by a participant" (Danielson, Tuler; & Webler, 2009, p. 25). These idealized factors are also called social perspectives that the researcher must interpret in order to write a narrative that describes and explains them. Participants were placed into subgroups that represented their "distinct voices" (Donner, 2001, p. 32) on the issue of using audience response systems in the basic technology class. As suggested by Donner (2001), participants were not placed into groups based on negative factor loadings because of the difficulty of

interpreting these loadings. Also, as Donner (2001) did in a sample Q-sort, participants were eliminated from group placement if they did not load cleaning only a single factor.

Factors 1 and 2 emerged as significant in the English Q-sorting activity unrotated factor matrix with eigenvalues of 1.6452 and 1.1323, as shown in table 10. Brown (2005) remarked that the initial correlation matrix is not of great importance other than as a transitional tool for finding factors with significant loadings and identifying clusters of similar perceptions. Varimax rotation was performed on the two factors (see Table 12), and it was demonstrated that Participants #2003 (.6904) and #50015 (.7855) loaded significantly positive on factor 2, while participants #92200 (.8758) and #74956 (.8666) loaded positively on factor 1.

The normalized factor Z-scores table is an idealized archetypal Q-sort showing "how a hypothetical respondent with a 100% loading on that factor would have ordered all the statements in the Q-set" (Van Excel, 2005, p. 9). Analysis of the normalized factor scores for the English Q-sort cohort , taking into consideration the four constructs originally identified and grounded in second language acquisition theory, revealed two subgroups within the four participants performing the English Q-sort.

In the Spanish Q-sort that revealed three factors, participants #75966 (.7836), #67121 (.7748), and #72909 (.6916) loaded purely on factor 1, while participant #50059 (.7083) split a dominant loading on factor 1 with a significant loading (.4358) on factor 2. Factor 2 was defined mostly by participants #11467 (.6926) and #34612 (.6458), and less significantly by participant #50059 (.4358). Factor 2 was contradicted by participants #58490 (-.4116) and #27740 (-.7739) who loaded at significantly negative levels for this

factor. Finally, participants #80018 (.8129) and #15055 (.6487) defined factor 3, and contradicted by participant #64454 (-.5454).

While the English Q-sort was easier to analyze because only two factors emerged and the sorts were pure, the Spanish Q-sort was more complicated because of mixed loadings in which participants loaded significantly on more than one factor. McKeown (personal communication, July 16, 2010) remarked that Q-sorts with only orthogonal factors that are independent of one another do not require the researcher to consider the subjectivity of the other factors because they are not influencing them for the most part. In contrast, mixed factors as present in the Spanish Q-sort add complexity. McKeown noted that participants that loaded significantly on the same two factors "share perspectives of those factors, and those factors provide the point of view of both of those people" (personal communication, July 16, 2010), while those participants whose sorts were bipolar to one another probably "do not have much in common with each other and would tend to be very disagreeable" (McKeown, personal communication, July 16, 2010).

Factor Interpretation

The factors revealed in this study were given names, as suggested by Donner (2001) in order to "Anchor the group in the audience's minds" (p. 37). The names determined for the factors were (a) *Techies* for Factor 1 in both the English and Spanish Q-sorts, (b) *Ambivalent Learners* for Factor 2 revealed in both the English and Spanish sorts, and (c) *Incognitos* for Factor 3 that was revealed specifically in the Spanish Q-sort activity. Donner (2001) suggested not assigning people to groups based on negative

loads because they are hard to interpret clearly. However, he also advised researchers to "avoid or ignore people who do not load cleanly onto a factor" (p. 33). Although participant #27740 (-.7739) loaded very negatively on factor 2, it was a pure loading because factor 2 was the only factor on which they loaded significantly negative. As described by Quiles (2009), Q-factor analysis in this study identified three factors that "are a composite of individuals who significantly load on one factor and no other factors" (p. 4), developing a hypothetical prototype that may be useful for exploring human subjectivity. Appendix D provides the Q-sort values for each of the statements in each factor.

Factor 1: Techies

The participants that defined Factor 1 identified, with their prioritization of Q-sort statements, as learners that enjoy using technology and are comfortable with the use of technology in an educational environment and using the audience response systems specifically. This was based on analysis of the Z-scores in the normalized factor scores for factor 1 (see Appendix E). This factor accounted for 41% of the total variance in the English Q-sort, and 23% of the total variance in the Spanish Q-sort. The significant discrepancy between these two levels of variance within Factor 1 may be explained by the fact that a third factor was revealed in the Spanish Q-sort that was related to English language proficiency. Therefore, participants' responses were more spread out than among factors than in the English Q-sort. Two participants out of the four that performed the English Q-sort, and five of the 11 participants that performed the Spanish Q-sort loaded significantly at $p<.05$ (0.36).

Although it can be assumed that all the participants in this study were interested in technology and willing to use it, as suggested by the fact that they all enrolled in a basic technology course and completed it, the Techies group demonstrated a more eager, open-minded attitude toward the use of the audience response systems, and a higher level of confidence and comfort with their use. Statements that were rated +4 or +3, as presented in the Table 14, indicate that participants in this group enjoy and feel comfortable with the use of clickers, preferring them over other more traditional forms of response.

Table 14
Factor 1: Techies, Agreement Statements (English Q-Sort)

Item no.	Statement	Rank score
15	I like using clickers more than answering aloud at the same time as everyone else.	+4
23	Using clickers is easier than speaking to answer questions or express opinions.	+4
25	I participate in class more	+3
27	I like speaking English in class.	+3

Two of the most positively ranked statements in the Spanish Q-sort related to the anonymity provided by audience response systems, as shown in Table 15. Anonymity may be more important to English language learners at lower levels of English language proficiency because of the Monitor Hypothesis as described by Krashen (1985). The Monitor is a cognitive mechanism in which the learner concentrates heavily on errors, pronunciation, grammar, and language form; this mechanism increases self-doubt and causes learners to be overly self-critical (Krashen, 1985).

Table 15
Factor 1: Techies, Agreement Statements (Spanish Q-Sort)

Item no.	Statement	Rank score
18	I like that no one knows who got answers right or wrong	+4
23	Using clickers helps me learn technology skills and knowledge.	+4
6	I like using clickers more than writing answer to questions.	+3
32	I like that everyone gets to answer questions at the same time by using the clickers.	+3

The main difference between the English Q-Sort and Spanish Q-Sort for Factor 1 were the statements, "I like speaking English in class," "I understand how the English language works," and "I feel confident about my pronunciation in English." The participants that chose to perform the Q-sort in English ranked the statement, "I like speaking English in class" positively, while the Spanish Q-sort participants did not rank it highly. The group that chose to do the Q-sort in Spanish ranked "I understand how the English language works" and "I feel confident about my pronunciation in English" negatively, while these statements were not ranked significantly by the English Q-sort participants. Other than that difference, both groups of participants that defined Factor 1 indicated that they enjoyed using the clickers more than using other response methods such as writing, speaking aloud, or using paper response cards.

The concept of learning content material appeared to be secondary to the participants in the Techies group, as illustrated in Table 16 by negative rankings by English Q-sorters on statements regarding the use of clickers to enhance learning or help them remember concepts.

Table 16
Factor 1: Techies, Disagreement Statements (English Q-Sort)

Item no.	Statement	Rank score
28	Using clickers makes lessons more understandable.	-4
32	Using clickers helps me remember the things I learn.	-4
29	Using clickers helps me understand other people's opinions	-3
5	I like that everyone gets to answer	-3
21	I like being able to express my opinions anonymously.	-3

Three of the four most negative rankings given by participants performing the Q-sort in Spanish shown in table 17 shows that they did not find the clickers to be valuable tools for learning and understanding English.

Table 17
Factor 1: Techies, Disagreement Statements (Spanish Q-Sort)

Item no.	Statement	Rank score
7	I like using clickers more than raising my hand.	-4
29	Using clickers makes lessons more understandable.	-4
12	I understand how the English language works.	-3
16	I feel confident about my pronunciation in English.	-3

The concept of the anonymity provided by the clickers was noticeably unappreciated by participants that performed the Q-sort in English, a result that was unexpected. The participants that defined Factor 1 may be more excited by the prospect of learning and using new technologies. The possibility of a novelty effect with the use of audience response system has been discussed in the research literature (Blood & Neel, 2008, p. 381). The basic technology course used as the setting for this study only lasted eight weeks, not allowing very much practice with the audience response systems in cognitively low-level activities and opinion-based polls before they were used to assess

student understanding or conduct assessments. It is suggested that audience response systems be introduced and that students be given many opportunities to practice with them in cognitively low-level activities and opinion-based polls before they are used for cognitively advanced questions used to assess student understanding or conduct summative assessments. Skinner (2009) stated that, "In order to move beyond gimmickry and academic funhouse techniques, instructors must carefully implement this technology" (p. 20). Participants that defined Factor 1 may have ranked the use of the clickers highly because they were excited about learning to use another type of technology, rather than because the clickers enhance communication or learning, supporting research conducted by Blood and Neel (2008) clickers and the novelty effect, and confirming the need for pedagogy to precede technology.

Factor 2: Ambivalent Learners

The participants that defined Factor 2 in both the English and Spanish Q-sorts indicated that they enjoyed using the clickers, just as those that defined Factor 1. However, this group displayed more ambivalence in their rankings. While both the English Q-sorters and the Spanish Q-sorters indicated that they preferred using clickers to using hand signals, the English Q-sorters did not prefer using clickers to writing. They also indicated that they were not comfortable using the clickers and that they did not think using them was fun. Two of the participants that loaded significantly on Factor 2 also loaded significantly on Factor 1, and two others loaded significantly on both Factors 2 and 3. Their statement rankings indicated that, although they were open-minded about using the clickers, they were not as excited about using them or comfortable with them as

the Techies group. They also demonstrated an appreciation of the anonymity provided by clickers, a perception that was only significant for the participants that performed the Q-sort in Spanish. Because of the obvious orthogonal nature of the perceptions demonstrated by participants that loaded significantly on Factor 2, this subgroup has been given the name Ambivalent Learners. Factor 2 accounted for 29% of the total variance in the English Q-Sort, and 19% of the total variance in the Spanish Q-sort. Two participants that performed the Q-sort in English and four participants that performed the Q-sort in Spanish loaded significantly at $p<.05$ (0.36).

The statements that were characteristic of Factor 2, ranked +4 and +3 by participants demonstrated that they felt the clickers helped them answer questions, and they appreciated the anonymity they provide. However, they did not express that they enjoyed using them, as the participants that defined Factor 1 (See Table 18 and Table 19).

Table 18
Factor 2: Ambivalent Learners, Agreement Statements (English Q-Sort)

Item no.	Statement	Rank score
1	Using clickers makes it easier for me to answer questions in class.	+4
10	I like that no one knows who got answers right or wrong when using clickers because it is anonymous.	+4
11	I like using clickers more than using hand signals to answer questions.	+3
15	I like using clickers more than answering aloud at the same time as everyone else.	+3

Table 19
Factor 2: Ambivalent Learners, Agreement Statements (Spanish Q-Sort)

Item no.	Statement	Rank score
20	I feel comfortable answering questions in class with clickers.	+4
22	Using clickers helps me remember the things I learn.	+4
10	I like discussing questions before and after answer them.	+3
27	I like using clickers more than using hand signals to answer questions.	+3

The statement the Ambivalent Learners group rated most negatively was that they considered using clickers to be fun, and they also indicated that they did not feel comfortable using them (see Table 20 and Table 21). The Spanish Q-sorters most negatively ranked statements focused on their lack of confidence about their English language proficiency.

Table 20
Factor 2: Ambivalent Learners, Disagreement Statements (English Q-Sort)

Item no.	Statement	Rank score
9	My answers are more honest	-4
22	Using clickers is fun.	-4
19	I like using clickers more than writing.	-3
2	I feel comfortable using clickers	-3

Table 21
Factor 2: Ambivalent Learners, Disagreement Statements (Spanish Q-Sort)

Item no.	Statement	Rank score
12	I understand how the English language works.	-4
16	I feel confident about my pronunciation in English.	-4
11	Discussing questions after seeing graphs showing responses	-3
14	I like speaking English in class.	-3

Statements related to content learning was rated at neutral levels, indicating that this group did not perceive the clickers to be very helpful for learning, but neither did they consider them a detriment. As with the Techies group, learning the content in relation to use of the audience response systems appears to be secondary to enjoyment and ease of use. Although these participants were enrolled in the same basic technology course as the Techies, their responses indicate that they are less receptive the Techies subgroup to using the clickers and other technologies. As with the Techies group, the participants that chose to perform the Q-sort in Spanish ranked statements related to English proficiency at significantly low levels, while this was not a significant issue with those that chose the English Q-sort.

Factor 3: Incognitos (Spanish Q-sort Only)

The third factor that emerged in the Spanish Q-sort is called the Incognitos because the statements this group ranked highest focused on the anonymity offered by the use of audience response systems and the ability to communicate and express oneself without speaking. This group also demonstrated a significant lack of confidence in their English language abilities, and their ability to understand lessons. The researcher believes this factor emerged specifically in this Q-sort because the four people who felt confident in their English abilities chose to perform the Q-sort in English. The participants in the Spanish Q-sort are assumed to have lower English language proficiency, possibly affecting their perceptions of the audience response systems as tools for communication. Participants that defined Factor 3 were specific to the Spanish Q-sort and accounted for 18% of the total variation. Three participants had pure significant loadings at $p < .01$

(.46+) (80018) .8129; (64454) -.5454; (15055) .6487 , while one participant had a mixed dominant loading (58490) .4668) with factor 2, .4116 at $p < .05$. These participants put anonymity as a higher priority than the other two groups, as demonstrated by the fact that all the rankings of +4 and +3 related to the ability to answer questions and see others' answers without having to identify themselves, call attention to themselves, or speak aloud (See Table 20).

Table 22
Factor 3: Incognitos, Agreement Statements (Spanish Q-Sort)

Item no.	Statement	Rank score
18	I like that no one knows who got answers right or wrong.	+4
28	I participate in class more when we use clickers.	+4
27	I like using clickers more than using hand signals to answer.	+3
19	I like being able to express my own opinions anonymously.	+3

Because this factor was revealed only in the Q-sort performed in Spanish, it is assumed that the perceptions of the participants defining Factor 3 relates to a lower level of self-confidence in English speaking proficiency.

Participants in the Incognitos group reported that, in addition to appreciate the ability for them to respond anonymously, they benefited from seeing others' responses so they could assess their own learning in comparison with other students. Gentry (2009) reported,

> While curious about the beliefs and practices of their peers, some students resist sharing insights about their own due to concerns about how their peers will react

to such revelations. Lack of knowledge or experience, as well as feelings of fear, shame, embarrassment, or anger, often underlie such resistance. (p. 62)

Disagreement statements that were ranked -4 and -3 in Table 21 were focused on English language proficiency and a low level of self-confidence in pronunciation and knowledge of English language structure.

Table 23
Factor 3: Incognitos, Disagreement Statements (Spanish Q-Sort)

Item no.	Statement	Rank score
8	Using clickers helps me learn English.	-4
21	Using clickers makes it easier for me to answer questions	-4
12	I understand how the English language works.	-3
16	I feel confident about my pronunciation in English.	-3

Although it can be supposed that the clickers would be most appreciated by participants that had lower levels of self-confidence about their English ability, there may be a division line in terms of English language proficiency. Those participants that are in the emergent to beginning-intermediate levels of English language acquisition may perceive clickers to be useful, enabling them to respond nonverbally to English content that they understand but cannot respond to. Participants with even lower levels of English language proficiency, however, that understand very little or no English at all, would not find the clickers useful for helping them answer questions posed in English because they would not understand the questions in the first place. This revelation suggests that the use of audience response systems with English language learners may be appropriate for learners at certain levels of language acquisition, but of little value for other levels of

acquisition. It is suggested that learners' levels of language acquisition be assessed before investing in audience response systems as an instructional tool.

McKay and Tom (1999) explained that English language learners may feel embarrassed, fearful of being criticized or ridiculed, or worried about being misunderstood (p. 2). They confirm the perceptions demonstrated by participants that defined the Incognitos group. The anonymity provided by audience response systems empowers them by allowing them to answer questions and express opinions without any fear of public humiliation or feelings of embarrassment caused by having incorrect responses exposed.

Consensus Statements and Interfactor Relationships

Participants who defined Factor 1 and Factor 2 agreed on statements indicating that they appreciated the ability to compare their answers with others', and that they participated more in class when using the clickers (See Tables 22 and 23) Tables 24 and 25.

Table 24
Consensus Statements and Interfactor Relationships- Factors 1 & 2 (English Q-Sort)

Item no.	Statement	Rank score
3	I like using clickers more than raising my hand.	-1
4	Using clickers helps me learn technology	0
7	Using clickers helps me pay attention	0
20	Seeing other people's answers	1
26	I feel confident about my pronunciation in English.	-1

Table 25
Consensus Statements and Interfactor Relationships- Factors 1 & 2 (Spanish Q-Sort)

Item no.	Statement	Rank score
3	I like using clickers more than answering aloud.	1
17	I like speaking Spanish in class.	1
28	I participate in class more when we use clickers.	1
4	I enjoy using technology for learning.	0
21	Using clickers makes it easier for me to answer questions.	0
19	I like being able to express my opinions anonymously.	-1
13	When the teacher asks a question, I usually raise my hand.	-2

As discussed previously, Tables 24 and 25 illustrate that those participants who performed the Q-sort in Spanish valued anonymity more than those who performed the English Q-sort. They also indicated that they enjoyed speaking Spanish in class and did not enjoy speaking English in class.

Table 26
Consensus Statements and Interfactor Relationships- Factors 1 & 3 (Spanish Q-Sort)

Item no.	Statement	Rank score
18	I like that no one knows who got answers right or wrong.	4
14	I like speaking English in class.	-1
12	I understand how the English language works.	-3
16	I feel confident about my pronunciation in English.	-3

Table 27
Consensus Statements and Interfactor Relationships- Factors 2 & 3 (Spanish Q-Sort)

Item no.	Statement	Rank score
27	I like using clickers more than using hand signals to answer	3
31	I enjoy using clickers to answer	1
7	I like using clickers more than raising my hand.	0
24	I like using clickers more than using paper response cards.	0

Participants' Comments

Participants' written comments about the use of the audience response systems provided more in-depth insights that were not possible through data analysis of the Q-sorting results. Limited experience with clickers and lack of familiarity with the tool was reported by one participant as a hindrance that reduced their effectiveness as communication tools. However, the anonymity offered by the tool was appreciated and the participant expressed that it may be a useful tool in classes in the future. Another participant expressed a preference for raising hands in class and responding verbally, rather than using the clickers, revealing a high level of self-confidence about English language proficiency.

Many English language learners may not be eager to speak aloud in class; in fact, many people are intimidated about speaking aloud in class in their native language. Confirming this statement, one participant explained that the clickers were good options for people who are shy or afraid to answer aloud in class because of worry about getting the wrong answer. Audience response technology allows participants to respond freely without self-consciousness or anxiety over having wrong answers, because only the leader is informed about participants' identity. In the case of group discussions involving sensitive or controversial issues, the facilitator can even modify the identification feature so that responses are made completely anonymously, further freeing users to express themselves without anxiety (Gentry, 2009). Premkumar and Coupal (2008) commented, "A student, hesitant to raise a hand in response to a sensitive question may feel no inhibition to responding using the audience response system" (p. 146). Sullivan (2009)

confirmed that the use of audience response systems "alleviates students' fear of embarrassment in front of their peers" (p. 337). Lucas (2009) concurred, "It is well established that a student's perceived status is the most influential factor in determining his or her level of participation in a group" (p. 224), and that traditional cooperative groups are often dominated by the higher status students. Second language acquisition theory defines a high Affective Filter as a state of mind characterized by high anxiety and low interest, creating a psychological state that hinders language acquisition (Krashen, 1982).

A high Affective Filter hinders the development of any content or skill, and is not limited to language acquisition. Audience response systems, as demonstrated in this study, may lower the Affective Filter by offering anonymity and the opportunity to participate and express one's opinions without fear of being embarrassed or corrected in public. Participants' high ranking of statements in this study related to the anonymity that audience response systems supports the research done with English language learners and the theory of second language acquisition (Krashen, 1985).

The usefulness of the audience response systems as instructional tools was confirmed by a participants' comment that the clickers helped them know if they had learned the materials in each class, and helped them assess their educational progress. Premkumar and Coupal (2008) stated that formative assessment made immediately possible through the use of audience response systems may be beneficial to learners as well as instructors. Feedback provided to students about their answers informs them about whether or not they understand the content (Premkumar & Coupal, 2008, p. 146).

Also, instant and anonymous feedback enables students are able to compare their own knowledge and understanding of the content with other students, without fear of embarrassment. Kenwright (2009) remarked that, if students noticed that most other students understood the material while they did not, they may be motivated to study more; conversely, it may be a consolation to students to realize that the content they found difficult was difficult for other students as well (p. 74).

One participant expressed the desire for the ability to input text messages rather than being limited to multiple choice and numeric responses. The limitation of question type to multiple choice, true and false, or numeric answers may be a critical drawback to using audience response systems. Although some response remote devices allow users to input text, the amount of text is limited to short answers, and a new problem of participants' varying levels of literacy may hinder instruction and learning. Beuckman, Rebello, and Zollman (2007) commented that short-answer and multiple-choice questions "do not replicate the kinds of open-ended questions that students have to answer on other course assessments" (p. 129). Also, although are audience response systems that provide the ability to enter short answers, the researcher wonders whether they would complicate instruction of English language learners in the emergent stages of proficiency or with learners who are not literate in any language.

Summary

This chapter described the use of Q-methodology to explore the perceptions of adult English language learners of audience response systems as communication aides in a technology course taught primarily in English. Results of this study may influence

instruction and assessment practices in adult education classes for English language learners. Rationale for the use of Q-methodology, an ipsative measurement approach, in a study focusing on subjective opinions was provided, and the structure and procedures of the methodology were explained. Difficulties and limitations revealed in the implementation of this study were identified and discussed. Conclusions drawn about the results of this study are discussed in chapter 5.

Chapter 5: Discussion, Conclusions, and Recommendations

The number of English language learning adults enrolled in adult education courses in the United States has increased in the past 20 years, and continues to grow (Goldenberg, 2008). The use of technology has become increasingly common in adult education programs (Coryell & Chlup, 2007), just as it has in other areas of society, education, and business. Many studies have been conducted with audience response systems to examine their effects on student motivation, participation levels, and their positive correlation with higher academic achievement (Edmonds & Edmonds, 2008; Mohr & Mohr, 2007; Thoms & Williams, 2008; Trees & Jackson, 2007; Yoon, 2007), but none were found that pertain to English language learners. The use of audience response systems with English language learners enrolled in adult education courses was not addressed in any studies, and although the silent phase has been discussed at length in regard to second language acquisition (Krashen, 1985). No studies were found that explored the thoughts and emotions of English language learners as they acquire a new language.

The purpose of the present Q-methodology study was to explore the perceptions of adult English language learners enrolled in a basic technology class about audience response systems as tools to facilitate communication, improve English language acquisition, and help them learn technology skills and knowledge. The study also investigated how participants felt about the audience response systems in comparison with other response tools such as paper cards, choral response, hand signals, and speaking aloud. Q-methodology was the research method utilized to measure participants'

subjective perceptions in an empirical way by having them rank statements about how they felt and thought about using audience response systems. By having participants rank each statement in relation to other statements, as opposed to having them rate each statement independently as done with Likert-type scales, the process is considered ipsative; it allows the researcher to perform quantitative analysis on subjective data because a distribution is created. The data produced by each participant are then correlated with other participants and clusters of similar Q-sort responses show possible typologies that could be expected to exist in similar environments.

The development of possible typologies may help improve adult education programs for adult English language learners by maximizing the potential of audience response systems as communicative and instructional tools. These typologies may help educators use the response systems with certain groups of learners and in specific situations that are most conducive to increasing learning and facilitating communication.

The results of this study revealed two factors with the four participants who chose to perform the Q-sorting activity in English, three factors for the larger group of 11 participants who chose to do the Q-sort in Spanish. The first two factors in each group aligned similarly, while the third factor may be understood as a factor connected to the lower level of English proficiency of the group that chose to do the sort in Spanish rather than English. The results of this study are examined in relation to current research and future research on the use of audience response systems in education with English language learners is suggested in the conclusion of this chapter. Suggestions affecting

positive social change are provided for more effective instructional and assessment practices for English language learners.

Factors in a Q-methodological study represent the predominant points of view that characterize groups of participants that rated the items in the Q-sort about their perceptions of audience response systems as communication and educational aids in similar ways. The research study was grounded in second language acquisition theory that describes a silent stage that second language learners pass through during which their receptive ability to understand content in their second language surpasses their ability to express it verbally. Quiles (2009) contended that, although points of view are difficult to study and measure precisely because of their subjective nature, factor analysis makes it possible for researchers to reveal theoretical frames in an empirical way. The factors in this study reveal points of view about the audience response systems that relate to participants' level of English language proficiency as well as their level of comfort and proficiency with technology.

All participants in this study were adults enrolled in an adult basic technology course. While it was assumed that all of them had some interest in learning to use technology and accepting of the use of technologies in personal, professional, and educational settings because they voluntarily enrolled in this course, some variation in levels of acceptance were expected. Increased student age was correlated with increased language anxiety and decreased levels of motivation (Bernaus, Moore, & Cordeiro, 2007; Wray & Fitzpatrick, 2010), and Coryell & Chlup, (2007) contended that older students may be resistant to using technology (p. 270). Adult English language learners were

described as being more anxious than younger learners because of worry about “making mistakes, losing face, criticism, negative evaluation, and judgmental remarks” (Pichette, 2009, p. 77). Although this statement about adult English language learners’ levels of anxiety and worry about losing face relate to their English language proficiency, it is suggested that these same feelings of doubt and anxiety would extend to proficiency with current technologies. These feelings of anxiety are reflected in the disagreement statements made by participants ranking feeling comfortable and enjoying the use of clickers at significantly low levels in the Q-sort and support prior research on English language learners and second language acquisition (Krashen, 1985).

One facet that must be considered with older students is the impact of their past educational experiences. The use of student response systems forces students into active roles in the learning process, a role that some students may not welcome because it "violates expectations that the large course professor will simply provide information that they then memorize for tests" (Trees & Jackson, 2007, p. 25). Older students were reported to be more accustomed to a passive learning environment (MacGeorge et al, 2008). Because the courses in the Family University are ungraded and not given for credit, participants may not have expected to be quizzed or required to respond in any way. They may have desired to learn technology skills without having to demonstrate their learning. The use of audience response systems, in addition to the other methods of response utilized in the course, may have been unexpected and unwelcome components of the class they enrolled in, supporting the prior research conducted with audience response systems with adult learners (MacGeorge et al, 2008).

Current research revealed that students, as well as teachers, indicated several disadvantages to the use of clickers, most of them technical in nature. Students reported that the clickers were complicated and difficult to use, and there were problems with clickers not operating correctly, not turning on, turning off in the middle of the class, responses not being received, and problems logging in (Cunningham, 2008). These technical problems had the result of frustrating students instead of increasing motivation and engagement levels (Patry, 2009; Quinn, 2007). Cleary (2008) reported that a disadvantage of audience response systems is that there is no way to calculate the amount of time it takes each student to respond to questions, but conjectured that this may someday be possible (p. 44, par 1).

Although the audience response systems in this study functioned properly, they were not used during one course session because the quizzes designed for them were saved in a different computer and were unavailable for use, reminding educators that preparation is of utmost importance so that instructional time is not wasted and learners are not frustrated. Other considerations that should be made when utilizing audience response systems in the classroom are having extra batteries in case some clickers stop working, having back-up plans in case the multimedia projector stops functioning. These considerations are relevant in any educational environment that relies on the use of technology.

Another factor that should be considered when deciding to use audience response systems with adult English language learners and investing in their purchase is the

amount of time learners have spent in the United States and their level of acculturation. This tool has been compared to a television set remote control (O'Hanlon, 2007; Sullivan, 2009) and discussed as the voting device used in the popular game show, Who Wants to Be a Millionaire (Mula & Kavanagh, 2009). The telephone was described as a type of audience response system as it used as a voting device for the musical competition television show, American Idol (O'Hanlon, 2007). Familiarity with these elements of popular may make the tool more easily and quickly accepted.

Implications

The purpose of this study was to explore the perceptions of adult English language learners about the use of audience response systems as communication aids in a classroom environment. As in other sectors of society, education, and business, the use of technology has become increasingly common in adult education programs (Coryell & Chlup, 2007). The use of technology may serve two functions in the instruction of adult English language learners: appropriate tools may facilitate second language acquisition, and current technology skills and knowledge may contribute to adult English language learners' academic and professional opportunities (Ibarz & Webb, 2007). Technology skills were identified as critical for professional success in the 21st century, and adult English language learners expressed satisfaction about developing their English language skills and computer skills at the same time, (Ibarz & Webb, 2007, p. 219).

Advantages associated with the use of audience response systems, according to current research, include: anonymity, simultaneous active involvement of all students, immediate feedback for the teacher and students, and reduced anxiety for students (Barnes, 2008;

Blood & Neel, 2008; Carnagahn & Webb, 2007; Edmonds & Edmonds, 2008; Hoekstra, 2008; Keller, Finkelstein, Perkins, Pollock, Turpen, & Dubson, 2007; Lucas, 2009; MacGeorge et al., 2008; Morgan, 2008; Morling et al, 2008; Mula & Kavanagh, 2009; Nelson & Hauck, 2008; Patry, 2009; Salemi, 2009; Sullivan, 2009; Trees & Jackson, 2007; Walker & Barwell, 2009; Yourstone et al, 2008). In addition, learners may be empowered by being able to have a voice in discussions (Barnes, 2008; Cunningham, 2008; Keller et al, 2007; Lincoln, 2008; Mula & Kavanagh, 2009; Premkumar & Coupal, 2008; Trees & Jackson, 2007). However, when considering the use of this instructional tool with English language learners, this study demonstrated that considerations must be made in light of second language acquisition theory to assure that the tool is used in a way that is most beneficial to students and in a way that maximizes its potential to empower learners. These considerations include age, English language proficiency, technology experience and level of comfort, and years of education in any country because these factors may greatly influence learners' acceptance of the technology and ability to use it effectively.

Research Question 1: What are English language learners' perceptions of audience response systems as tools to facilitate communication in a predominantly English-speaking classroom environment?

Second language acquisition theory, as explained by Krashen (1985), relates directly to this research question. According to this theory, second language learners pass through a silent phase in which their receptive abilities in the second language surpass their expressive abilities (Krashen, 1985). Therefore, this study sought to determine

whether audience response systems are a valuable tool for education of English language learners by allowing them to answer questions nonverbally. While most participants in this study indicated that they enjoyed using the clickers, and 66% of them reported that they preferred answering with clickers over other response methods, only one strongly agreed and one agreed that the clickers helped them express themselves in English. One facet of communication, however, was shown to be important to the participants who performed the Q-sort in Spanish. This facet was the characteristic of anonymity provided by the clickers, supporting the concept of the Affective Filter (Krashen, 1985) in which communication by second language learners is stifled when they feel put on the spot or forced to reveal their lack of language proficiency by speaking aloud in front of others. Therefore, while this study does not support the view that clickers are effective educational tools for English language learners, it suggests that educational strategies that protect learners from anxiety or embarrassment may be beneficial and are appreciated by learners.

This study demonstrated that audience response systems may be more beneficial for certain groups of adult English language learners, depending on their level of English language proficiency. Emergent to beginning and intermediate learners may find the clickers to be useful and empowering because of the ability to respond nonverbally to questions they understand but cannot articulate. However, if the learners have such low levels of English proficiency that they do not understand the questions posed, the audience response systems would not be expected to have value to them as communication aides, as supported by the results of this study demonstrating varying

levels of appreciation and acceptance among the participants. This revelation suggests that pre-assessment of learners is necessary before beginning instruction with audience response systems in order to use them in the most effective way.

Another concept related to the use of clickers in regard to communication involves the ability for students to alert the teacher whether they understand the content of the lesson. This, in turn, enables teachers to assess learners' understanding and adjust instruction as necessary. Lincoln (2008) introduced the concept of contingent teaching, explained as teaching that responds directly to students' needs (p. 42), and asserted that "instructors using clickers effectively are those subscribing to the contingent teaching style" (p. 42). Contingent teaching is made possible with the use of clickers because students' responses and demonstration of understanding or lack of understanding of course content directs the teachers' actions and subsequent teaching and questioning. Salemi (2009) contended that using audience response systems is an effective way for teachers to check for understanding during a lecture (p. 391), and Yourstone et al (2008) confirmed that formative assessment is facilitated with the use of audience response systems because teachers can check for comprehension of the entire group at intervals during the lesson (p. 75). In this study, however, the clickers were not utilized to their full potential by the teacher of the course. They were only used at the beginning of class to review the materials taught during the previous class session. They were not used throughout the lesson to assess understanding, and teaching did not change according to learners' responses. Learners' perceptions of clickers, as tools for communication, may

have been more positive if they had used them to express their educational needs and provide authentic feedback to the teacher.

Research Question 2: What are English language learners' perceptions of audience response systems as tools to facilitate English language acquisition and learning technology skills content?

New technologies continue to be developed and introduced in educational settings, and some of these technologies may have the potential to enhance the instruction of English language learners. However, it is contended that pedagogy must be the priority when selecting tools for education, and care must be taken not to adopt tools that may be detrimental to learning (Skinner, 2009). In this study, the instructor of the basic technology course had expertise in many types of technology, but limited experience and expertise with the use of audience response systems in particular. Coryell and Chlup (2007) stressed that users must first be comfortable using the technology, explaining: technology should be seen as a tool, guided by research-based pedagogy and practice rather than an end in itself. In addition, the course instructor was not a certified teacher and, therefore, lacked the methodological knowledge and training required to use the clickers in the most pedagogically beneficial ways.

Coryell and Chlup (2007) contended that allowing students enough time and patience to complete tasks and assignments was necessary to keeping reluctant computer users engaged. It was emphasized that care must be taken not to overwhelm or confuse English language learners with overly complex technology tools and tasks (Coryell & Chlup, 2007). The course instructor in this study was naturally skilled in meeting these

instructional requirements, and had an excellent rapport with the students as well as the ability to converse with them fluently in their native language. However, Brown et al (2007) emphasized the importance of aligning any instructional approaches with natural cognitive functioning by “Promoting deep understanding, building on prior knowledge, permitting learners to control the learning process, engaging learners in extensive reading, supporting learners in accessing curricular content, and enabling them to harvest the language they are reading” (p. 108).

It is not sufficient to give students clickers and begin to use them in a haphazard fashion if cognitively advanced levels of learning are the desired outcome. Effective pedagogy is emphasized as the priority, while the technology is secondary (Skinner, 2009). Skinner (2009) stated that, "In order to move beyond gimmickry and academic funhouse techniques, instructors must carefully implement this technology" (p. 20). Careful construction of questions leading to cognitively high levels of discussion and thinking and alignment of audience response system activities with instructional goals was advocated in order to maximize the tool's potential to assess students' understanding and opinions. The use of Bloom's Taxonomy was recommended to help educators create effective questions (Skinner, 2009, p. 20).

Audience response systems may also be very effectively used with questions and lessons designed with Marzano’s (2007) New Taxonomy of Educational Objectives. This taxonomy extends Bloom’s taxonomy in a way that promotes critical thinking skills, supported by Freire’s (1970) concept of dialogics as a way to empower oppressed people by enabling them to express their opinions and demonstrate their knowledge. Although

Marzano (2007) commended Bloom's Taxonomy as a longlasting and valuable contribution to the educational and psychological knowledge base, he contended that it oversimplifies cognition and learning. Marzano's taxonomy includes three systems of knowledge. The Self-System includes emotions and beliefs about learning, the Metacognitive System involves monitoring accuracy, learning, goals, and clarity; and the Cognitive System includes tasks similar to those included in Bloom's taxonomy such as knowledge recall, synthesis, evaluation, classification, synthesis, and problem solving (Intel, 2006). With the use of audience response systems, learners may be able to express emotions and opinions about the learning task, evaluate their own and other learners' responses with the help of the graphs the audience response system software displays, and engage in other activities that enhance critical thinking. However, it is argued that teachers must be knowledgeable about the taxonomy and comfortable enough with it to design effective lessons and develop challenging questions.

Smetana and Wilson (2009) recommended creating and posing questions to students that stimulate metacognition because it causes students to think critically and reflect on their learning, leading to better understanding of the material. Questioning was proposed by Korkmaz (2009) as a critical 21st century skill for professional and academic success (p. 513), and he emphasized the necessity of creating questions that require high levels of cognitive processing (p. 513, par 2). Although questions are usually posed by teachers following a lesson to assess understanding of the presented content, the researchers suggested using questions to stimulate interest, curiosity, and prior knowledge before beginning a lesson (p. 514).

Lincoln (2008) stated that it may be difficult to find high-quality questions in the commercially available banks of questions, and suggested that more cognitively advanced questions are more often created by the instructors (p. 42). He recommended that, when creating questions for use with the clickers, instructors should design them to respond to the content of the lesson, the types of cognitive processing students should be using, and the beliefs about learning they want students to internalize (Lincoln, 2008, p. 42).

Instructors may promote metacognitive behaviors by pausing during lectures for students to indicate anonymously whether they understand the material, and if review or additional clarification of concepts is needed. This practice may deepen learning because "self-questioning is a research-based practice that helps students independently monitor and regulate their thinking" (p. 25). Korkmaz (2009) contended, "Good questions are purposeful, clear, brief, natural, and thought-provoking" (p. 521) and he emphasized that questions should stimulate students' analysis and evaluation of content, not just require rote memorization of facts (p. 521). The practice of interspersing lectures with clicker questions may relate to Mayer's twelve principles of multimedia learning, specifically the segmenting principle (Mayer, 2009) because it breaks extensive amounts of input into smaller, more cognitively manageable segments.

In addition to designing questions that promote discussion and critical thinking, instructors should use audience response systems in creative ways that may not involve traditional questioning. The use of other instructional strategies such as cooperative learning work in combination with the use of audience response systems may enhance the

potential for this tool to facilitate active processing and creation of constructivist learning environments (Barnes, 2008; Cohen et al, 2008; Lucas, 2009). Other possible uses of audience response systems in the classroom environment include peer instruction and assessment, data entry in science experiments, mock trials, and other constructivist instructional activities.

Lincoln (2008) emphasized, "The ability of clickers to deliver desirable outcomes is mostly a function of how clickers are used, not whether or not they are used" (p. 39). Pedagogy was confirmed to be the most important element for designing and implementing effective instruction, rather than the tools used in the process. It is suggested that the advice given by Lincoln (2008) can be applied to all educational tools in addition to audience response systems: "Most challenges are only addressed when instructors carefully design course pedagogy and activities so that student use of clickers is a means to an end and not an end unto itself" (p. 45).

The results of this study may have been very different if the instructor of the basic technology course had been certified and trained in research-based instructional methodologies, cognizant of pedagogical issues regarding the use of technology in an educational environment, and highly skilled and comfortable with the use of the audience response systems as an instructional tool. The instructor of this course only used the clickers at the beginning of each class as a review of the previous class session. He was noticeably uncomfortable with the use of the quiz software that accompanies the response system: his teaching style, normally fluid and natural, became consistently hesitant and detached when reading the questions for use with the clickers. The instructor’s lack of

experience and comfort with the clickers may have influenced participants' perceptions of the tool. In addition, he did not use the tool in the most pedagogically beneficial way as described by current research on student response systems as described previously.

Research Question 3: What are English language learners' perceptions of audience response systems in comparison with other forms of verbal and nonverbal response?

In the short-answer survey part of this study, 66% of the participants indicated that they preferred using the audience response systems over other forms of response in the classroom. Statements that participants rated highly positive also indicated that participants preferred using the clickers to raising their hand and speaking aloud in English, writing, or using paper cards. However, they also indicated that they did not perceive the clickers to be particularly beneficial for learning and remembering class content, expressing their opinions, or understanding others' opinions. This contradiction suggests that participants' preference for using the clickers over other forms of response may have been related to their enrollment in a basic technology course and their desire to learn how to use educational technologies.

Recommendations for Action

The implications of this research suggest several recommendations for action that may lead to positive social change. These actions include more comprehensive teacher training in educational technology emphasizing research based practices in which the technology tools fit the educational task and not the other way around. Teachers should also be highly trained, competent, and very comfortable with the audience response systems before using them with their students. Other recommendations include pre-

assessment of students' needs, technology proficiency levels, and language proficiency levels before implementing any use of educational technologies with them. Finally, this study emphasized the need for advanced preparation when using any technologies in an educational setting. Not only can technical difficulties cause delays, they may increase new users' frustration and doubt in regard to using technology in class.

Teacher training

As described previously, the instructor for the course in this study was not a certified teacher and, therefore, did not have the experience or training necessary to maximize the potential of the audience response systems as communication or instructional aides. He also was minimally trained and experienced with the use of the audience response systems, a fact that was evident in his attitude and teaching style when using them. Current research as discussed above emphasized the importance of pedagogy over technology. Therefore, it is suggested that thorough teacher training be provided with any implementation plans including audience response systems. Teachers should not only be completely familiar and comfortable with the tool, they should be experts in creating constructivist learning activities and developing questions for use with the clickers that promote critical thinking and metacognition in learners.

Pre-assessment of learners before use with clickers.

Kenwright (2009) stated that audience response systems may be useful to assess students' prior knowledge before a lesson (p. 74) in order to determine what material should be taught and what should only be superficially reviewed or skipped altogether. In addition, when students' prior knowledge is tapped into, it may transfer unconscious

knowledge into working memory so it can be reprocessed and used in the context of new information. This tool may be especially useful for assessing prior knowledge of English language learners. Krashen (1981) emphasized the importance of accessing prior knowledge in order to make new information more comprehensible for second language learners, and audience response systems may facilitate accomplishing this because they allow all students to respond simultaneously and anonymously. The assumption made prior to the study that participants would possess a high literacy levels in Spanish was in error based on the performance of participants. In-class activities and the Q-sorting process revealed that the majority of participants had low levels of literacy in Spanish, as well as low levels of English language proficiency and low levels of technology expertise. Therefore, it is suggested that all use of audience response systems in an educational setting be preceded by an assessment of learners' prior educational experience, language levels, technology expertise, interests, and educational needs.

Technical support and backup plans

Professionals in the field of educational technology must always be prepared for technical difficulties. Relying completely upon any form of technology without any type of alternative plan will lead, inevitably, to disaster in the form of a wasted educational experience. While educational technologies may be useful, convenient, motivating, and may have the ability to enhance instructional activities, there is no guarantee that they will function at any given time. Therefore, educators and researchers must be prepared with alternative tools or instructional activities in the case of technical difficulties. A

character trait of flexibility, adaptability, and a sense of humor are also suggested as requirements for educators using technology for instruction.

Limitations

This study reveals insights into the perceptions of adult English language learners about the use of audience response systems as communication aids in a classroom environment. There are, however, several limitations to this study. Some limitations were anticipated before the study was conducted, and others surfaced during the study and during analysis of the results. The following two limitations were expected and explained in the introduction:

1. This study cannot be generalized for the entire population of non-English speaking parents of K-12 students in the United States because only a limited number of parents participated.
2. Generalizability is further limited by including only parents enrolled in adult education courses, because many adult English language learners may not have any experience in the American educational system or with technology, and many may not have the beginning levels of English language proficiency necessary for participation in this study.

Additional limitations to this study developed as a result of technical difficulties with the WebQSort (Correa, 2004) Internet-based Q-sorting program that prevented accurate collection of demographic information that was linked to specific Q-sorts. The Q-sorting activities were designed with pre-sort questions and post-sort questions about demographic factors such as English language proficiency, technology proficiency, and

years of school in any country. These questions appeared on some participants' screens when they began the Q-sort, but failed to appear on others. Therefore, extensive correlations between demographic data and Q-sort responses were impossible to determine beyond the comparison between those participants that chose to perform the Q-sort in English and those that chose to do it in Spanish.

The WebQSort (Correa, 2004) program has not been functioning at all for the past three weeks: it is impossible for researchers to log in, and even the example Q-sort link on the webpage produces an error. An email sent to the author three weeks ago has not been responded to, although he had responded to other emails sent in the past year and corrected reported problems. If the researcher of this study had not saved the results immediately, it would be impossible to analyze the data.

Although these developments were disappointing because they reduced the effectiveness of this study, they also reveal issues that must be considered by professionals in the field of educational technology. Internet-based resources may be convenient and free of cost, but there are disadvantages that must be considered such as the stability of the program and unreliable technical support. It is suggested that, although stand-alone programs that do not require Internet access may be more trustworthy, even these eventually become obsolete and there are no guarantees that technical support or updates will be available. The most recent release of the PQMethod (Schmolck, 2002) data analysis program was in 2002, and it is very difficult to run the program on current computers. A compatibility troubleshooting program must be run in order to use it, and one component of the program designed for factor rotation did not respond to the

compatibility troubleshooter. Caution is suggested for researchers not to depend on the functionality of Internet-based or computer-based resources unless the researcher is the author and creator of the program. This caution may be extended beyond Q-sorting tools to other research tools such as Internet-based surveys.

One final limitation was revealed in this study related to participants' native language literacy levels. Although the participants were known to be English language learners and, therefore, assumed to have low levels of English language literacy, they were assumed to have average levels of Spanish language literacy because of their enrollment in an adult education technology class. All instructions and Q-sorting materials were provided in English and in Spanish in order to increase content validity, with the assumption that all participants would be able to read and understand the materials. However, assumption of high literacy levels in Spanish was shown in the study to be unsubstantiated, as demonstrated by participants having difficulty reading the statements in Spanish. Some of the participants needed to have the statements read aloud to them. The overestimation of participants' native language literacy levels may have weakened the validity of the data collected in this study.

Future Research

The potential for student response systems to enhance egalitarian learning environments by allowing all students to express themselves, to increase student motivation and engagement, suggests that their use may be a valuable tool in all educational environments and should be further studied to reveal their possibilities and limitations.

K-12 English language learning students

The present study was conducted with adult English language learners in the context of an adult basic technology course. Ironically, younger English language learning students may be able to use the audience response systems and perform the Q-sort more easily than adults because they often have much more experience with technology in their daily lives. It is suggested that audience response systems may have the potential to greatly enhance education of English language learners in the American school system. McIntyre (2008) indicated that by the year 2030, K-12 students enrolled in American schools are projected to be 40% English language learners. This statistic underlines the importance of studying and enhancing the instruction of this particular population of American students.

Adult English language learners in intermediate or advanced technology courses

This study was conducted within the context of an eight-week basic technology course. All participants with the exception of one were not skilled or competent with any type of technology, including the audience response systems. It is suggested that assessment of this tool as a communication and instructional tool should be conducted with a group of learners who are already comfortable with technology and, therefore, less likely to be influenced by a novelty effect or by fear and frustration connected with learning a new technology. A study conducted over a longer period of time would also serve the same purpose.

Adult English language learners with average to advanced native language literacy levels

As described in the limitations section, many of the participants in this study did not possess the Spanish language literacy levels necessary to be able to perform the Q-sorting activity independently. It is suggested that this study be conducted again with English language learners that have been assessed in their native language and have literacy levels at high school or college levels. This study could be conducted in other countries as well as in the United States with college students who are learning English. Conducting this study in a university setting would ensure at least basic levels of native language literacy.

Quantitative Studies

No studies on the use of audience response systems with English language learners were located, other than the one done with deaf and hard of hearing students (Thoms & Williams, 2008). It is suggested that a quantitative study with English language learners, whether adults or children, comparing levels of motivation, frequency of response, academic achievement, attendance, and levels of participation between courses using audience response systems and those using more traditional forms of response may be enlightening and beneficial to determine if this tool justifies the investment required to use it.

Conclusions

One problem identified in the instruction of second language learning adults was that they are often not allowed to remain silent until they feel ready to speak in their

second language. Krashen (1982) indicated, "They may be asked to produce very early, before they have acquired enough syntactic competence to express their ideas" (p. 27). The use of audience response systems provide a way for English language learners to respond to content that they understand, but are unable or unwilling to respond to verbally. The findings of this study demonstrate that, within the adult English language learner community, are more finely focused subgroups of similar perceptions by learners about the use of audience response systems. Learners at the lowest levels of English proficiency may not find the clickers useful at all because they do not understand most of the content they are expected to respond to. However, learners at beginning and early-intermediate stages of English language acquisition indicate that they feel empowered and freed by the ability the tool gives them to respond to content in a nonverbal and anonymous way.

In addition to the potential for audience response systems to empower adult English language learners by enabling them to respond nonverbally, technology skills and knowledge may greatly enhance opportunities for employment, a significant benefit in light of statistical information that indicates most English language learners suffer from poverty and low levels of education (Ballantyne et al, 2008). Wrigley et al (2009) advocated for educational programs that specifically respond to the needs of adult English language as a way to support new American citizens and also benefit American society as a whole. Technology skills were identified as critical for professional success in the 21st century, and adult English language learners expressed satisfaction about developing their English language skills and computer skills at the same time, (Ibarz &

Webb, 2007, p. 219). Participants varied in their level of technology competence and comfort, and this has been interpreted as an influence on their rankings of the audience response systems as communication and educational tools.

In an increasingly global world society and economy, multilingual skills are extremely beneficial; multilingual skills in combination with high-level technology skills are invaluable. In fact, the meaning of literacy may be changing from its previous definition that was limited to the ability to read and write in one's native language to 21st century technological skills and knowledge in addition to basic reading and writing proficiency (Kamil & Lane, 1998). The use of audience response systems guided by research-based pedagogy is suggested by this study to bridge the distance between receptive and expressive English language skills so that learners can acquire basic technology skills and other content before acquiring fluency in English at the level of academic proficiency. The goal of this study is confirmed by Mathews-Aydinli (2008) in the statement, "The need to improve language and vocational skills of the American population of English language learners was described as critical for the sake of "economic stability" (p. 199). The three factors identified in this study revealed learners perceptions about audience response systems in connection with technology proficiency and levels of acceptance, and language proficiency. Their differing viewpoints indicate that educators must be careful when using this tool, as with any other instructional tool, to assess the learners and the instructional environment and content to ensure that they use the tool in the most educationally beneficial way.

Educators may be motivated by this study to use audience response systems in more cognizant ways, being careful to design questions that maximize the potential of the instructional tool, and to assess learners' needs, attitudes, and abilities. It is hoped that researchers that read the study may be motivated to conduct further research into the use of audience response systems with English language learning adults and children, leading to better educational experiences for the large and ever-increasing numbers of English language learners in American schools. These are the students who form a very large component of our society, therefore, improving their educational experience is expected to benefit society as a whole.

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Appendix A: Letters of Permission and Consent

CONSENT FORM

You are invited to take part in a research study of the use of clickers (audience response systems) as a way for adult English language learners to respond in classes with content in English. You were chosen for the study because you are enrolled in a Family University class in basic technology skills. This form is part of a process called "informed consent" to allow you to understand this study before deciding whether to take part.

My name is Lisa Rodriguez, a doctoral student at Walden University, and I would like to conduct a research study on how you felt about using the clickers while taking this class.

The purpose of this study is to explore the use of response systems (clickers) as ways to help adult English language learners respond to questions in classes with content in English. The focus of this research will be your ideas, feelings, and opinions of using the clickers to respond to questions and quiz questions written in English.

If you agree to be in this study, you will be asked to do an activity at the end of the course to express your opinions and feelings about the use of the clickers.

Your participation in this study is voluntary. This means that everyone will respect your decision of whether or not you want to be in the study. No one at the Woodburn School District Family University or in the Woodburn School District will treat you differently if you decide not to be in the study. If you decide to join the study now, you can still change your mind during the study. If you feel stressed during the

study you may stop at any time. You may skip any questions that you feel are too personal.

There are no known risks to participating in this study. Benefits to participating in the study include learning how to use the electronic audience response systems (clickers), and having the opportunity to express opinions and demonstrate learning. Your participation in this study may help improve learning experiences for adult English language learners by contributing to research on instructional tools that may enable them to participate and express their opinions and knowledge more completely in classrooms with content taught in English.

There is no compensation for participation in this study.

Any information you provide will be kept confidential. The researcher will not use your information for any purposes outside of this research project. Also, the researcher will not include your name or anything else that could identify you in any reports of the study.

You may ask any questions you have now. Or if you have questions later, you may contact the researcher via 503-609-0298 or LRodriguezETC@comcast.net. If you want to talk privately about your rights as a participant, you can call Dr. Leilani Endicott. She is the Walden University representative who can discuss this with you. Her phone number is 1-800-925-3368, extension 1210. Walden University's approval number for this study is IRB approval number will go here and it expires on expiration date goes here.

The researcher will give you a copy of this form to keep.

Statement of Consent:

I have read the above information and I feel I understand the study well enough to make a decision about my involvement. By signing below, I am agreeing to the terms described above.

Printed Name of Participant

Date of consent

Participant's Written or Electronic* Signature

Researcher's Written or Electronic* Signature

Electronic signatures are regulated by the Uniform Electronic Transactions Act. Legally, an "electronic signature" can be the person's typed name, their email address, or any other identifying marker. An electronic signature is just as valid as a written signature as long as both parties have agreed to conduct the transaction electronically.

FORMA DE CONSENTIMIENTO

Está invitado a participar en un estudio de investigación sobre la utilización de clickers electrónicos (sistemas de respuesta) como modos de responder en clases de los estudiantes adultos aprendices del idioma Inglés donde el contenido es en inglés. Usted fue elegido a participar debido a que usted está registrado en una clase de habilidades básicas de tecnología en la Universidad para las Familias. Esta forma es parte de un proceso llamado de "consentimiento informado" para permitirle entender este estudio antes de decidir si toma parte o no.

Mi nombre es Lisa Rodriguez, estoy estudiando mi doctorado en la Universidad de Walden, y quisiera hacer una investigación sobre sus opiniones de los clickers que usaban en esta clase.

El propósito de este estudio es para explorar el uso de clickers electrónicos como formas de ayudar a los estudiantes adultos aprendices del idioma Inglés a responder a preguntas en las clases donde el contenido es enseñado en inglés. El enfoque de esta investigación serán sus ideas, sentimientos y opiniones de usar los clickers cuando respondieron a las preguntas y preguntas de los concursos escritos en inglés.

Si está dispuesto participar en este estudio, se le pedirá hacer en una actividad al final del curso para expresar sus opiniones y sentimientos sobre el uso de los clickers.

Estudio de naturaleza voluntaria

Su participación en este estudio es voluntaria. Esto significa que todos van a respetar su decisión de participar o no en el estudio. Nadie en la Universidad de Familias o en el Distrito Escolar de Woodburn le tratará de forma diferente si decide no estar en el

estudio. Si decide participar en el estudio ahora, aun así, puede cambiar de opinión durante el estudio. Si se siente estresado durante el estudio puede parar en cualquier momento. Puede omitir cualquier pregunta que usted cree que son demasiado personales.

No hay riesgos conocidos por participar en este estudio. Los beneficios de participar en el estudio incluyen aprender a usar los sistemas electrónicos de respuesta de audiencias (clickers), y tener la oportunidad de expresar sus opiniones y demostrar su aprendizaje. Su participación en este estudio puede ayudarle a mejorar sus experiencias de aprendizaje para estudiantes adultos que aprenden inglés, contribuir a la investigación sobre herramientas de instrucción que puede permitirles participar y expresar sus opiniones y conocimientos más completamente en las clases con contenido que se enseña en inglés.

No hay ninguna compensación por participar en este estudio.

Cualquier información que usted proporcione será confidencial. El investigador no utilizará su información para ningún propósito fuera de este proyecto de investigación. Así mismo, el investigador no incluirá su nombre o cualquier otra cosa que pueda identificarle en los informes del estudio.

Contactos y preguntas

Usted puede hacer cualquier pregunta que tenga ahora, o si tiene preguntas más tarde, puede comunicarse con el investigador al 503-609-0298 o al correo electrónico: LRodriguezETC@comcast.net. Si desea hablar en privado sobre sus derechos como participante, puede llamar a Dr. Leilani Endicott. Ella es el representante de la Universidad de Walden que puede hablar de esto con usted. Su número de teléfono es 1-

800-925-3368, extensión 1210. Número de autorización de la Universidad Walden para este estudio es la IRB escribirá el número de aprobación aquí y caduca el IRB ingresara la fecha de caducidad.

El investigador le dará una copia de esta forma.

Declaración de consentimiento:

He leído la información anterior y creo que entiendo el estudio lo suficientemente bien como para tomar una decisión acerca de mi participación. Al firmar a continuación, estoy

Nombre impreso del participante

Fecha de consentimiento

Firma escrita o electrónica * del participante

Firma escrita o electrónica * del investigador

Las firmas electrónicas son reguladas por la Ley Uniforme de Transacciones Electrónicas. Legalmente, una "firma electrónica" puede ser el teclear el nombre de la persona, su dirección de correo electrónico o cualquier otra marca de identificación. Una firma electrónica es tan válida como una firma escrita, siempre y cuando ambas partes hayan acordado llevar a cabo la transacción electrónicamente.

Letter of Cooperation from the Woodburn School District
Parent and Community Outreach Program

Woodburn School District Family University
Sonia Kool
Mateo Courtney
Parent and Community Outreach Program Coordinators

1495Aztec Drive
Telephone:(503)981-7640
Fax: (503) 982-3634

Dear Lisa Rodriguez, Date: April 8, 2010

Based on my review of your research proposal, I give permission for you to conduct the study entitled Perceptions of Adult English Language Learners of Audience Response Systems as Communication Aides within the Woodburn School District Family University. As part of this study, I authorize you to conduct a Q-sorting activity in which students will put statements about their perceptions of the audience response systems (clickers) in rank order according to how little or how much they agree with them. Individuals' participation will be voluntary and at their own discretion. We reserve the right to withdraw from the study at any time if our circumstances change.

I confirm that I am authorized to approve research in this setting. I understand that the data collected will remain entirely confidential and may not be provided to anyone outside of the research team without permission from the Walden University IRB.

Sincerely,
Mateo Courtney
Parent, Teacher, Migrant Outreach Program Coordinator
Woodburn School District

Appendix B: Q Sorting Instructions

Conditions of Instruction
Welcome!
pr107086: "Perceptions of Clickers as Communication Aides in English"
Please click the submit button to begin the study.

Submit

Please answer the following questions.
1. What is your level of English ability?

1 2 3 4 5

Low . . …High

2. What is your level of technology ability?

1 2 3 4 5

Low . . High

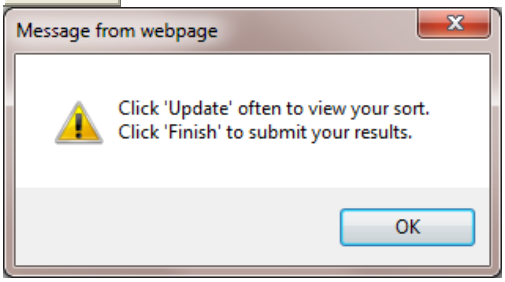
3. Years of school (in any country)

Please sort the statements in order according to how little or how much you agree with them.

The farther to the left, to the negative numbers, the more you DISAGREE with the statement.

The farther to the right, toward the positive numbers, the more you AGREE with the statement.
Please click the button below to continue

Continue



+4	This category needs 2 more statements	-4	-3	-2	-1	0	+1	+2	+3	+4
+3	This category needs 2 more statements	-4	-3	-2	-1	0	+1	+2	+3	+4
+2	This category needs 4 more statements	-4	-3	-2	-1	0	+1	+2	+3	+4
+1	This category needs 5 more statements	-4	-3	-2	-1	0	+1	+2	+3	+4
0	6 statements should be sorted into this category. There are too many statements in this category	-4	-3	-2	-1	0	+1	+2	+3	+4
13.	I feel comfortable using clickers to express my opinions in class.									
14.	Using clickers is fun.									
20.	I like using clickers more than answering aloud at the same time as everyone else.									
27.	I enjoy using technology for learning.									
12.	Using clickers is easy for me.									
21.	I like using clickers more than writing answers to questions.									
17.	I like using clickers more than raising my hand and speaking English in class.									
28.	Using clickers helps me learn English.									
8.	Using clickers helps me understand other people's opinions better.									
5.	I enjoy discussing questions before and after answering them.									
30.	Discussing questions after seeing graphs showing responses helps me learn.									
16.	I feel confident about my English grammar.									
4.	When the teacher asks a question, I usually raise my hand.									
23.	I like speaking English in class.									
26.	Using clickers helps me pay attention to the lesson.									
15.	I feel confident about my pronunciation in English.									
24.	I like speaking Spanish in class.									
11.	I like that no one knows who got answers right or wrong when using clickers because it's anonymous.									
6.	I like being able to express my opinions anonymously with clickers.									
9.	I feel comfortable answering questions in class with clickers.									
3.	Using clickers makes it easier for me to express my opinions.									
32.	Using clickers helps me remember the things I learn.									
25.	Using clickers helps me learn technology skills and knowledge.									
18.	I like using clickers more than using paper response cards to answer questions.									
29.	Seeing other peoples' answers to questions helps me learn.									
22.	Using clickers is easier than speaking to answer questions or express opinions.									
19.	I like using clickers more than using hand signals to answer questions.									
7.	I participate in class more when we use clickers.									
31.	Using clickers makes lessons more understandable.									
1.	Using clickers makes it easier for me to answer questions in class.									
10.	I enjoy using clickers to answer questions in class.									
2.	I like that everyone gets to answer questions at the same time by using the clickers.									
-1	This category needs 5 more statements	-4	-3	-2	-1	0	+1	+2	+3	+4
-2	This category needs 4 more statements	-4	-3	-2	-1	0	+1	+2	+3	+4
-3	This category needs 2 more statements	-4	-3	-2	-1	0	+1	+2	+3	+4
-4	This category needs 2 more statements	-4	-3	-2	-1	0	+1	+2	+3	+4

Appendix C: Rank Statement Totals Within Each Factor (English)

No.	Statement	Factors No.	1		2	
1	Using clickers makes it easier for me to answer questi	1	0.55	11	1.74	1
2	I feel comfortable...	2	1.05	5	-1.34	29
3	I like using clickers more than raising my hand..	3	-0.49	21	-0.51	24
4	Using clickers helps me learn technology...	4	0.00	17	0.00	17
5	I like that everyone gets to answer	5	-1.07	30	0.11	16
6	I enjoy using clickers	6	0.02	14	0.35	13
7	I like using clickers more than using paper	7	-0.29	20	-0.64	26
8	Using clickers helps me pay attention	8	-0.25	19	0.27	14
9	My answers are more honest	9	1.03	6	-1.98	31
10	I like that no one knows	10	0.80	9	1.71	2
11	I like using clickers more than using hand signals...	11	0.00	17	1.12	4
12	I enjoy using technology....	12	0.82	7	-0.11	18
13	When the teacher asks...	13	-0.02	18	0.88	7
14	Using clickers is easy...	14	0.78	10	-0.35	22
15	I like using clickers more than answering aloud at the	15	2.10	1	1.26	3
16	Using clickers helps me learn English.	16	0.80	9	0.96	6
17	I enjoy discussing....	17	-0.80	24	0.51	10
18	I feel comfortable using clickers to express my opinio	18	-1.03	27	0.72	9
19	I like using clickers more than writing...	19	0.23	13	-1.47	30
20	Seeing other people's answers ...	20	0.51	12	0.37	12
21	I like being able to express my opinions anonymously..	21	-1.05	29	-0.24	21
22	Using clickers is fun.	22	0.00	17	-2.46	32
23	Using clickers is easier than speaking...	23	1.85	2	-1.23	28
24	discussing questions after seeing graphs ...	24	-0.82	25	-0.13	19
25	I participate in class more...	25	1.28	3	0.86	8
26	I feel confident about my pronunciation in English.	26	-0.78	23	-0.24	21
27	I like speaking English in class.	27	1.07	4	-0.64	26
28	Using clickers makes lessons more understandable.	28	-1.60	31	-0.37	23
29	Using clickers helps me understand other people's opin	29	-1.05	29	-0.75	27
30	I understand how the English language works.	30	-0.53	22	0.24	15
31	I like speaking Spanish in class.u	31	-1.01	26	0.99	5
32	Using clickers helps me remember the things I learn.	32	-2.10	32	0.37	12

Correlations Between Factor Scores

	1	2
1	1.0000	-0.0317
2	-0.0317	1.0000

Appendix D: Rank Statement Totals with Each Factor (Spanish Q-Sort)

No.	Statement	Factors No.	1		2		3	
1	I feel comfortable using clickers to express my opinio	1	-0.55	21	1.14	6	0.28	13
2	Using clickers is fun	2	-0.51	19	1.16	5	-0.62	24
3	I like using clickers more than answering aloud	3	0.62	11	0.13	13	-0.33	22
4	I enjoy using technology for learning.	4	0.47	14	0.04	15	0.43	10
5	Using clickers is easy for me.	5	0.63	10	-0.57	25	-0.06	17
6	I like using clickers more than writing answers to que	6	1.21	4	-0.08	17	0.81	7
7	I like using clickers more than raising my hand	7	-1.77	31	0.13	14	-0.11	18
8	Using clickers helps me learn English.	8	-0.81	26	0.82	8	-2.21	32
9	Using clickers helps me understand other people's opin	9	-0.20	17	1.07	7	0.52	9
10	I like discussing questions...	10	-0.71	24	1.24	3	-0.03	16
11	Discussing questions after seeing graphs showing respo	11	-0.95	27	-1.53	29	1.09	5
12	I understand how the English language works.	12	-1.63	30	-2.14	32	-1.55	30
13	When the teacher asks a question, I usually raise my h	13	-0.96	28	-0.73	26	0.34	11
14	I like speaking English in class.	14	-0.53	20	-1.64	30	-0.50	23
15	Using clickers helps me pay attention...	15	0.44	15	-0.79	27	0.62	8
16	I feel confident about my pronunciation in English.	16	-0.97	29	-1.77	31	-1.09	29
17	I like speaking Spanish in class.	17	0.52	13	0.68	9	0.21	15
18	I like that no one knows who got answers right or wron	18	1.76	1	-0.43	23	2.21	1
19	I like being able to express my opinions anonymously..	19	-0.67	23	-0.28	21	1.43	3
20	I feel comfortable answering questions in class with c	20	0.59	12	2.18	1	-0.66	25
21	Using clickers makes it easier for me to answer questi	21	0.07	16	-0.10	18	-1.84	31
22	Using clickers helps me remember the things I learn.	22	-0.74	25	1.36	2	-0.30	21
23	Using clickers helps me learn technology...	23	1.63	2	-1.00	28	-0.21	19
24	I like using clickers more than using paper response c	24	1.16	5	-0.01	16	0.25	14
25	Seeing other people's answers to questions helps me lea	25	-0.42	18	-0.27	20	0.90	6
26	Using clickers is easier than speaking...	26	1.06	6	-0.16	19	-0.85	27
27	I like using clickers more than using hand signals to	27	-0.64	22	1.17	4	1.22	4
28	I participate in class more when we use clickers.	28	0.72	9	0.23	12	1.76	2
29	Using clickers makes lessons more understandable.	29	-1.87	32	-0.53	24	-1.02	28
30	My answers are more honest...	30	0.93	7	0.64	10	-0.24	20
31	I enjoy using clickers to answer...	31	0.73	8	0.34	11	0.33	12
32	I like that everyone gets to answer....	32	1.38	3	-0.32	22	-0.79	26

Appendix E: Descending Array of Differences Between Factors

Descending Array of Differences Between Factors 1 and 2 (English Q-Sort)

No.	Statement	No.	Type 1	Type 2	Difference
23	Using clickers is easier than speaking...	23	1.851	-1.230	3.081
9	My answers are more honest	9	1.032	-1.978	3.010
22	Using clickers is fun.	22	0.000	-2.460	2.460
2	I feel comfortable...	2	1.052	-1.337	2.389
27	I like speaking English in class.	27	1.072	-0.641	1.714
19	I like using clickers more than writing...	19	0.233	-1.471	1.703
14	Using clickers is easy...	14	0.779	-0.348	1.127
12	I enjoy using technology....	12	0.819	-0.107	0.927
15	I like using clickers more than answering aloud at the same	15	2.104	1.256	0.848
25	I participate in class more...	25	1.285	0.856	0.429
7	I like using clickers more than using paper	7	-0.293	-0.641	0.348
20	Seeing other people's answers ...	20	0.506	0.374	0.131
3	I like using clickers more than raising my hand..	3	-0.485	-0.508	0.022
4	Using clickers helps me learn technology...	4	0.000	0.000	0.000
16	Using clickers helps me learn English.	16	0.799	0.963	-0.164
29	Using clickers helps me understand other people's opinions..	29	-1.052	-0.748	-0.304
6	I enjoy using clickers	6	0.020	0.348	-0.328
8	Using clickers helps me pay attention	8	-0.253	0.267	-0.520
26	I feel confident about my pronunciation in English.	26	-0.779	-0.241	-0.538
24	discussing questions after seeing graphs ...	24	-0.819	-0.133	-0.686
30	I understand how the English language works.	30	-0.526	0.241	-0.767
21	I like being able to express my opinions anonymously...	21	-1.052	-0.241	-0.811
13	When the teacher asks...	13	-0.020	0.882	-0.902
10	I like that no one knows	10	0.799	1.711	-0.912
11	I like using clickers more than using hand signals...	11	0.000	1.123	-1.123
5	I like that everyone gets to answer	5	-1.072	0.107	-1.180
1	Using clickers makes it easier for me to answer questions...	1	0.546	1.738	-1.191
28	Using clickers makes lessons more understandable.	28	-1.598	-0.374	-1.224
17	I enjoy discussing....	17	-0.799	0.508	-1.307
18	I feel comfortable using clickers to express my opinions...	18	-1.032	0.722	-1.754
31	I like speaking Spanish in class.u	31	-1.011	0.989	-2.001
32	Using clickers helps me remember the things I learn.	32	-2.104	0.374	-2.478

Descending Array of Differences Between Factors 1 and 2 (Spanish Q-Sort)

No.	Statement	No.	Type 1	Type 2	Difference
23	Using clickers helps me learn technology...	23	1.628	-0.998	2.626
18	I like that no one knows who got answers right or wrong...	18	1.755	-0.435	2.190
32	I like that everyone gets to answer....	32	1.382	-0.323	1.705
6	I like using clickers more than writing answers to questions	6	1.210	-0.084	1.294
15	Using clickers helps me pay attention...	15	0.440	-0.790	1.230
26	Using clickers is easier than speaking...	26	1.063	-0.155	1.218
5	Using clickers is easy for me.	5	0.632	-0.572	1.204
24	I like using clickers more than using paper response cards.	24	1.164	-0.009	1.173
14	I like speaking English in class.	14	-0.532	-1.638	1.106
16	I feel confident about my pronunciation in English.	16	-0.969	-1.765	0.796
11	Discussing questions after seeing graphs showing responses..	11	-0.954	-1.526	0.572
12	I understand how the English language works.	12	-1.630	-2.138	0.509
28	I participate in class more when we use clickers.	28	0.723	0.230	0.493
3	I like using clickers more than answering aloud	3	0.624	0.134	0.490
4	I enjoy using technology for learning.	4	0.474	0.040	0.433
31	I enjoy using clickers to answer...	31	0.732	0.342	0.390
30	My answers are more honest...	30	0.925	0.644	0.282
21	Using clickers makes it easier for me to answer questions...	21	0.073	-0.103	0.176
25	Seeing other people's answers to questions helps me learn.	25	-0.423	-0.270	-0.152
17	I like speaking Spanish in class.	17	0.521	0.684	-0.162
13	When the teacher asks a question, I usually raise my hand.	13	-0.959	-0.727	-0.232
19	I like being able to express my opinions anonymously...	19	-0.668	-0.279	-0.389
9	Using clickers helps me understand other people's opinions..	9	-0.201	1.069	-1.271
29	Using clickers makes lessons more understandable.	29	-1.867	-0.528	-1.339
20	I feel comfortable answering questions in class with clicker	20	0.588	2.179	-1.591
8	Using clickers helps me learn English.	8	-0.810	0.820	-1.630
2	Using clickers is fun	2	-0.512	1.162	-1.674
1	I feel comfortable using clickers to express my opinions	1	-0.550	1.141	-1.690
27	I like using clickers more than using hand signals to answer	27	-0.639	1.172	-1.811
7	I like using clickers more than raising my hand	7	-1.766	0.128	-1.894
10	I like discussing questions...	10	-0.711	1.237	-1.948
22	Using clickers helps me remember the things I learn.	22	-0.742	1.361	-2.104

Descending Array of Differences Between Factors 1 and 3 (Spanish Q-Sort)

No.	Statement	No.	Type 1	Type 3	Difference
32	I like that everyone gets to answer....	32	1.382	-0.787	2.169
21	Using clickers makes it easier for me to answer questions...	21	0.073	-1.842	1.915
26	Using clickers is easier than speaking...	26	1.063	-0.848	1.911
23	Using clickers helps me learn technology...	23	1.628	-0.207	1.835
8	Using clickers helps me learn English.	8	-0.810	-2.207	1.398
20	I feel comfortable answering questions in class with clicker	20	0.588	-0.655	1.243
30	My answers are more honest...	30	0.925	-0.236	1.161
3	I like using clickers more than answering aloud	3	0.624	-0.326	0.950
24	I like using clickers more than using paper response cards.	24	1.164	0.246	0.918
5	Using clickers is easy for me.	5	0.632	-0.061	0.693
31	I enjoy using clickers to answer...	31	0.732	0.329	0.403
6	I like using clickers more than writing answers to questions	6	1.210	0.813	0.396
17	I like speaking Spanish in class.	17	0.521	0.207	0.314
16	I feel confident about my pronunciation in English.	16	-0.969	-1.091	0.122
2	Using clickers is fun	2	-0.512	-0.619	0.108
4	I enjoy using technology for learning.	4	0.474	0.426	0.047
14	I like speaking English in class.	14	-0.532	-0.497	-0.035
12	I understand how the English language works.	12	-1.630	-1.552	-0.078
15	Using clickers helps me pay attention...	15	0.440	0.619	-0.179
22	Using clickers helps me remember the things I learn.	22	-0.742	-0.300	-0.443
18	I like that no one knows who got answers right or wrong...	18	1.755	2.207	-0.452
10	I like discussing questions...	10	-0.711	-0.026	-0.685
9	Using clickers helps me understand other people's opinions..	9	-0.201	0.519	-0.720
1	I feel comfortable using clickers to express my opinions	1	-0.550	0.278	-0.827
29	Using clickers makes lessons more understandable.	29	-1.867	-1.016	-0.851
28	I participate in class more when we use clickers.	28	0.723	1.759	-1.035
13	When the teacher asks a question, I usually raise my hand.	13	-0.959	0.339	-1.298
25	Seeing other people's answers to questions helps me learn.	25	-0.423	0.897	-1.319
7	I like using clickers more than raising my hand	7	-1.766	-0.110	-1.657
27	I like using clickers more than using hand signals to answer	27	-0.639	1.223	-1.862
11	Discussing questions after seeing graphs showing responses..	11	-0.954	1.087	-2.041
19	I like being able to express my opinions anonymously...	19	-0.668	1.433	-2.101

Descending Array of Differences Between Factors 2 and 3 (Spanish Q-Sort)

No.	Statement	No.	Type 2	Type 3	Difference
8	Using clickers helps me learn English.	8	0.820	-2.207	3.027
20	I feel comfortable answering questions in class with clicker	20	2.179	-0.655	2.834
2	Using clickers is fun	2	1.162	-0.619	1.781
21	Using clickers makes it easier for me to answer questions...	21	-0.103	-1.842	1.739
22	Using clickers helps me remember the things I learn.	22	1.361	-0.300	1.661
10	I like discussing questions...	10	1.237	-0.026	1.264
30	My answers are more honest...	30	0.644	-0.236	0.880
1	I feel comfortable using clickers to express my opinions	1	1.141	0.278	0.863
26	Using clickers is easier than speaking...	26	-0.155	-0.848	0.693
9	Using clickers helps me understand other people's opinions..	9	1.069	0.519	0.550
29	Using clickers makes lessons more understandable.	29	-0.528	-1.016	0.488
17	I like speaking Spanish in class.	17	0.684	0.207	0.477
32	I like that everyone gets to answer....	32	-0.323	-0.787	0.464
3	I like using clickers more than answering aloud	3	0.134	-0.326	0.460
7	I like using clickers more than raising my hand	7	0.128	-0.110	0.237
31	I enjoy using clickers to answer...	31	0.342	0.329	0.013
27	I like using clickers more than using hand signals to answer	27	1.172	1.223	-0.051
24	I like using clickers more than using paper response cards.	24	-0.009	0.246	-0.255
4	I enjoy using technology for learning.	4	0.040	0.426	-0.386
5	Using clickers is easy for me.	5	-0.572	-0.061	-0.511
12	I understand how the English language works.	12	-2.138	-1.552	-0.587
16	I feel confident about my pronunciation in English.	16	-1.765	-1.091	-0.674
23	Using clickers helps me learn technology...	23	-0.998	-0.207	-0.791
6	I like using clickers more than writing answers to questions	6	-0.084	0.813	-0.897
13	When the teacher asks a question, I usually raise my hand.	13	-0.727	0.339	-1.066
14	I like speaking English in class.	14	-1.638	-0.497	-1.141
25	Seeing other people's answers to questions helps me learn.	25	-0.270	0.897	-1.167
15	Using clickers helps me pay attention...	15	-0.790	0.619	-1.409
28	I participate in class more when we use clickers.	28	0.230	1.759	-1.528
19	I like being able to express my opinions anonymously...	19	-0.279	1.433	-1.712
11	Discussing questions after seeing graphs showing responses..	11	-1.526	1.087	-2.613
18	I like that no one knows who got answers right or wrong...	18	-0.435	2.207	-2.642

Appendix F: Factor Q Sort Values for Each Statement

Factor Q-Sort Values for Each Statement (English Q-Sort)

No.	Statement	No.	1	2
1	Using clickers makes it easier for me to answer questions...	1	1	4
2	I feel comfortable...	2	2	-3
3	I like using clickers more than raising my hand..	3	-1	-1
4	Using clickers helps me learn technology...	4	0	0
5	I like that everyone gets to answer	5	-3	0
6	I enjoy using clickers	6	0	1
7	I like using clickers more than using paper	7	-1	-2
8	Using clickers helps me pay attention	8	0	0
9	My answers are more honest	9	2	-4
10	I like that no one knows	10	1	4
11	I like using clickers more than using hand signals...	11	0	3
12	I enjoy using technology....	12	2	0
13	When the teacher asks...	13	0	2
14	Using clickers is easy...	14	1	-1
15	I like using clickers more than answering aloud at the same	15	4	3
16	Using clickers helps me learn English.	16	1	2
17	I enjoy discussing....	17	-1	1
18	I feel comfortable using clickers to express my opinions...	18	-2	1
19	I like using clickers more than writing...	19	1	-3
20	Seeing other people's answers ...	20	1	1
21	I like being able to express my opinions anonymously...	21	-3	-1
22	Using clickers is fun.	22	0	-4
23	Using clickers is easier than speaking...	23	4	-2
24	discussing questions after seeing graphs ...	24	-2	0
25	I participate in class more...	25	3	2
26	I feel confident about my pronunciation in English.	26	-1	-1
27	I like speaking English in class.	27	3	-2
28	Using clickers makes lessons more understandable.	28	-4	-1
29	Using clickers helps me understand other people's opinions..	29	-3	-2
30	I understand how the English language works.	30	-1	0
31	I like speaking Spanish in class.u	31	-2	2
32	Using clickers helps me remember the things I learn.	32	-4	1

Variance = 4.438 St. Dev. = 2.107

Factor Q-Sort Values for Each Statement (Spanish Q-Sort)

No.	Statement	No.	1	2	3
1	I feel comfortable using clickers to express my opinions	1	-1	2	1
2	Using clickers is fun	2	0	2	-1
3	I like using clickers more than answering aloud	3	1	1	-1
4	I enjoy using technology for learning.	4	0	0	1
5	Using clickers is easy for me.	5	1	-2	0
6	I like using clickers more than writing answers to questions	6	3	0	2
7	I like using clickers more than raising my hand	7	-4	0	0
8	Using clickers helps me learn English.	8	-2	2	-4
9	Using clickers helps me understand other people's opinions..	9	0	2	1
10	I like discussing questions...	10	-1	3	0
11	Discussing questions after seeing graphs showing responses..	11	-2	-3	2
12	I understand how the English language works.	12	-3	-4	-3
13	When the teacher asks a question, I usually raise my hand.	13	-2	-2	1
14	I like speaking English in class.	14	-1	-3	-1
15	Using clickers helps me pay attention...	15	0	-2	2
16	I feel confident about my pronunciation in English.	16	-3	-4	-3
17	I like speaking Spanish in class.	17	1	1	0
18	I like that no one knows who got answers right or wrong...	18	4	-1	4
19	I like being able to express my opinions anonymously...	19	-1	-1	3
20	I feel comfortable answering questions in class with clicker	20	1	4	-2
21	Using clickers makes it easier for me to answer questions...	21	0	0	-4
22	Using clickers helps me remember the things I learn.	22	-2	4	-1
23	Using clickers helps me learn technology...	23	4	-2	0
24	I like using clickers more than using paper response cards.	24	2	0	0
25	Seeing other people's answers to questions helps me learn.	25	0	-1	2
26	Using clickers is easier than speaking...	26	2	0	-2
27	I like using clickers more than using hand signals to answer	27	-1	3	3
28	I participate in class more when we use clickers.	28	1	1	4
29	Using clickers makes lessons more understandable.	29	-4	-1	-2
30	My answers are more honest...	30	2	1	-1
31	I enjoy using clickers to answer...	31	2	1	1
32	I like that everyone gets to answer....	32	3	-1	-2

Variance = 4.438 St. Dev. = 2.107

Curriculum Vitae

Lisa Ann Rodriguez

EDUCATIONAL EXPERIENCE

1985-1987	California State University, Northridge Bachelor of Arts, Liberal Studies California K-12 Teaching License
2002-2004	Western Oregon University, Monmouth, OR Masters of Science in Education with Bilingual Specialization Endorsement
2007-2008	Portland State University Portland, OR E-Learning Systems Program Certificate
2007-2010	Walden University Minneapolis, MI Doctoral Candidate, Educational Technology

PROFESSIONAL EXPERIENCE

2004-Present	Technology Teacher and Staff Trainer Woodburn School District
2001-2004	Bilingual Teacher Woodburn School District
1987-2000	Bilingual Teacher Los Angeles Unified School District
1984-1987	Interpreter for the Deaf California State University, Northridge
1983-1985	Administrative Assistant and Interpreter for the Deaf World Games for the Deaf Los Angeles, CA