Transitioning of the ESL Student to the Mainstream Classroom

Howard A. Kavanagh
St. John Fisher College

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Abstract
This study looked at the transitioning of English Speakers of Other Languages (ESOL) students from the English Language Learner's (ELL's) classroom to the mainstream or general education classroom. The primary focus was to observe students from one elementary grade (3rd grade) who are part of an English Language Learner (ELL) program and compare their development the following year (4th grade) after transitioning to the mainstream classroom. The primary subject area dealt with was Mathematics, specifically, word problems. These students that moved from the ELL classroom were studied to look for the progress, or lack of progress, by students who subsequently moved to the general education classroom. There appears to be limited studies done on this aspect of educational transitioning. By attempting to understand what occurred it is hoped to make future transitions a positive step in student growth.

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DEDICATION

To Brigit,

My loving wife who has supported me from the beginning in all of my endeavors, and still continues to do so today. Not only do I “Thank You”, but my students do too!!

You have been my GREATEST teacher!!
ACKNOWLEDGEMENTS

I would like to thank Doug Llewellyn, an “All-Star” teacher and human being... the guy that said “you’d be good with the kiddies”. His guidance, support, and patience with me over the past few years have helped me gain the passion I seek as a teacher.

Thanks also to another “All-Star” teacher, Joe Priola. If you look up the word “passion” in the dictionary, Joe’s picture would be there. He made me jealous in a most noble way... I wanted that same passion to teach that he has shown!

I wish to express my appreciation to Dr. Diane Barrett, Dr. Lucia Guarino, Mr. Ed Currier, and the great group of teaching professionals at St. John Fisher College.

Finally, thanks to my teaching colleagues at School No. 50 in the Rochester City School District. They not only offer support, but make each and every day special. Their support and friendship helped me to stay focused on this project and provided me with the encouragement to continue when the going got tough.
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Transitioning of the ESL Student to the Mainstream Classroom

Choosing the topic

This study looked at a sample of English Language Learner (ELL) students who have transitioned to the general education, mainstream classroom. The topic was chosen based on experience with students by the researcher-as-teacher doing this project. The study came about from the author's experience while teaching a third grade class composed entirely of Learning English Through Academic Program (LEAP) students. The LEAP acronym appears to be a proprietary term used only in the Western New York State School district where the author teaches. Concern initially arose as to why these students were placed in this mode of class. Using this as an impetus, further examination as to the development of those students once moved into the mainstream became the focal point. Primary focus was their development and growth once they advanced from the special education classroom provided for ELL students to the mainstream where little, if any, special accommodations were provided. The author of this study subsequently taught a mainstream, general education fourth grade classroom that contained five ELL students from the previous year's third grade LEAP class.

Significance

The ESOL student at some point is moved into a mainstream, general education, classroom environment. Having access to those students made it all the more important to see what growth or progress that did or did not take place. The study attempts to offer evidence as to whether making such a transition is always a sensible move.
**Knowledge to be gained**

In some of the literature that was reviewed it was pointed out that the ESL student could assimilate to the mainstream classroom. However, the literature read for this study was inconclusive or quite varied as to what time frame is needed before such a move can occur. One of the aspects of this study was an attempt to find a time frame that demonstrated when the student was prepared.

**What the study attempted to show**

An attempt was made to provide tangible evidence as to what occurred when the transitioning of the ESL student to the mainstream classroom took place. In this instance the abovementioned students that moved from third to fourth grade were the subjects for this study. There are little, if any, literature studies that are available on this particular topic. It is hoped that because of this limited information that the study encourages more work on this topic.
Literature Review

This Literature Review will discuss the transitioning of the English as a Second Language (ESL) student into the mainstream classroom. There has not been much research on this topic as a whole. The studies and writings reviewed here deal with looking at ESL students and how they were taught prior to entering the mainstream classroom. It partly addresses ESL students and how they are prepared prior to their move to the regular classroom. In addition, the information examined teacher attitudes toward ESL students entering their regular classroom. The majority of the literature focused on what needs the ESL student has for subjects taught in English. The student's ability to understand written problems by the ESL student in their non-native language was an ongoing focal point. The literature looked at what essentials teachers need to be proficient to teach these students once they enter the regular classroom. Researchers continued to strive for answers to such questions as: How to assess young ESL students? What innovations in literacy practices were done for the ESL learner? What were some misconceptions about teaching the ESL learner? What pedagogical ways were most effective when the ESL student moves to the regular classroom? The information in the literature addressed these questions.

Perspectives and misconceptions

In a research article by Penfield (1987), regular classroom teachers responded to survey questions designed to get perspectives on how to effectively deal with ESL students. Findings were that regular teachers had little knowledge with regard to the English as a Second Language (ESL) teacher. The prevalent response by those regular teachers to the survey was the need to be trained in how to teach the ESL student.
Schirmer, Casbon, and Twiss (1996) complemented the Penfield article by pointing out that teachers must deal with their own attitudes towards ESL students and how best to teach them. The overwhelming consensus was that reforms in pedagogy were needed to better serve these students. Harper and de Jong (2004) wrote about misconceptions in teaching the diverse learner. These misconceptions were: exposure to native English language speakers resulted in improved English-language learning, ELS students learned at the same pace as non-ELS students, good teaching was the same for both native speakers and ELS students, and that nonverbal support was not necessary. This article pointed out that ELS students were challenged not only in reading and writing content areas but in math where word problems are used. The need to address these misconceptions to fully meet the ELS student’s needs was addressed earlier (Schirmer, et al., 1996). Vang (2006) pointed out that Limited English Proficiency (LEP) students also struggled with math and science due to limited language skills. These cited studies stated the commonality that it was a shared responsibility of the ESL teacher and the regular classroom teacher to improve in the way we accommodated the ESL student.

Assessment views

Research by Collier (1987) stated that LEP students entering a ESL program at ages 8-11 were faster achievers requiring only two to five years to reach national norms in reading, language arts, math, science, and social studies. Those in this group reached the 50th percentile on national norms. Collier went on to state that those at ages five to seven were one to three years behind the performance of those peers who entered at 8-11. She continued in saying that language used in school by those students became more abstract as students moved from one grade to another and concluded that as long as testing is done in the mainstream to measure
academic achievement to move from one level to the next, ESL educators needed to use such tests to assess their ability.

In a measurement study done of grades 1-5 reading skills by Spanish-speaking English Language Learners, Ramirez and Shapiro (2006) found that Spanish-speaking English Language Learners (ELL) rates of growth were significantly slower than general education students. This study also found that fluency and comprehension were not connected. In comparing general education students reading in English to those ESL students, they read more fluently in English than the Spanish-speaking ELLs did in Spanish. They claimed that teachers should have high expectations for all students without basing them only on absolute standards, but also on the rate of learning. They ended their remarks by specifying that although Spanish-speaking ELLs performed less consistently than general education students, however, they still showed some gains. Ramirez and Shapiro noted that studying these students over a longer period of time was needed to better assess their development. This study stated the need for more research to determine the rate of improvement by Spanish-speaking ELLs in both English and their native tongue. They went on to say that looking just at differences between general education students and ELLs was not enough.

In research by Shaftel, Belton-Kocher, Glasnapp, and Poggio (2006), they investigated the impact of language characteristics in math testing and performance of English language learners. They tested students at 4th, 7th, and 10th grades. They found that difficult math vocabulary had a consistent effect on ELL students at all grades. More so, those words having ambiguous or multiple meaning caused an increase in difficulty, especially at 4th grade. They found that reducing the number of words, avoiding complex sentences, easier vocabulary words,
and avoiding multiple-meaning words in test questions were a better way to address the language issue. Shaftel, et al., suggested that these may have unfairly impacted performance on some ELL students. The test method used in this study was a multiple-choice format presented in word problem form. The number of multiple meaning words per question ranged from two words in each of six questions for fourth grade students to a mean of 45 words in three questions for 10th grade. They suggested that fourth graders were more influenced by test language. The study also suggested that fourth graders were more sensitive to those words with complex word problems than the older students. In their conclusions they claimed that once language proficiency is acquired, test questions may no longer impact performance. They closed by stating that if this area is addressed, especially in large-scale assessments, the findings would be of interest to such programs as directed by No Child Left Behind guidelines.

In research by Tedick and Walker (1994), they wrote of the need for a "communicative competence" (p.300) by America's students in their own as well as other languages. They went on to say that second language educators should rethink what they are doing and why. They continued by citing five fundamental problems of second language teacher education:

1) a failure to consider the interdependence between first and second languages and cultures, 2) the fragmentation and isolation of language arts fields themselves, 3) the pervasive view of language as 'object', 4) a paralyzing focus on methodology and 5) continued failure to reflect in practice the connection between language and culture.

(p.302)

In their conclusions they stated the need to work toward lasting change. They went on to say that teacher education alone, without changing in schools or the second language profession, would
not survive.

Agree to disagree

Research by Moreno and Duran (2004) looked at the role of verbal guidance in promoting learning in mathematics. The study said that if a visual representation were added to an arithmetic problem that included traditional symbolic representations it could be more suitable for less skilled students in English. The study had students using computers to answer arithmetic word problems. They found that computers were powerful aids to mathematical teaching. They also found that when learning math with these additional representations it could become overwhelming to the beginning learner. In their discussion they added that these additional symbolic representations helped students better understand these problems. Students were given the option to listen to the explanation in English or Spanish. They expected that students would listen in their native language, with Limited English Proficiency (LEP) students using Spanish explanations over English. LEP students did use more Spanish translations than English. They concluded by saying their research was limited because it dealt with only one knowledge domain (addition and subtraction), only verbal guidance, and one kind of learner (elementary students). Limited by the “wide realm of individual differences in learning” (p.502).

Research by Lee, Silverman, and Montoya (2002), wrote that proficiency in English should not be the leading reason to judge math performance in kindergarten and the primary grades. They went on to say that children can express math concepts in ways that do not need a broad range of language. Lee, Silverman, and Montoya stated that the use of objects, diagrams, and pictures, are some of the non-language techniques to use in expressing math concepts.
Further, Lee, Silverman, and Montoya stated that these techniques "give young children the opportunities to learn English in the course of math instruction while enhancing their ability to understand and demonstrate math concepts" (p.30). They also suggested the pairing of an ESL child with a native English classmate during such activities as math games as a form of self-assessment. In their conclusions they wrote that ESL children that failed to show improvement in math could be caused by poor language skills or inadequate instruction. They wrote that what may be needed is a wide range of assessment tools to explain this lack of improvement. Their final comments stated that traditional methods may not offer the same way to gauge the ESL student math prowess as these strategies and different approaches might offer. To conclude both Moreno and Duran, along with Lee, Silverman, and Montoya agree that the use of visual representation are essential strategies to be used by ESL students. What may possibly be paradoxical is the Moreno and Duran finding that beginning learners can be overwhelmed with added representations.

After mainstreaming

Another part of this literature review dealt with what took place after the ESL student was mainstreamed into the regular, general education classroom. In an article by Clair (1995), purposeful additional training for regular classroom teachers was proposed as one way to begin to address ways to teach the ESL student. She added that one time professional development courses may not always be effective training for the regular classroom teacher. Even with this training, she felt that many teachers still were learning on the job to teach the ESL student that is in their classroom. Curtin (2005) found that instructional styles used by the regular classroom teacher can impact recently mainstreamed ESL students. Her findings supported the use of
Transitioning of the ESL interactive teaching styles to improve ESL teaching for the regular classroom teacher.

Mainstreaming may not be the answer. In research by Young (1996), it was stated that teachers need to gain specialized skills to be effective with ESL students. Young went on to say that without these skills, mainstreaming is not a viable solution. Lastly, she agreed that ESL teachers saw things differently than subject-matter centered teachers. Collaboration and sharing were ways to become beneficial to the ESL student in the regular classroom.

Youngs and Youngs (2001) in their writings stated that the mainstream teacher is unprepared to meet the challenges of the cultural and diverse classroom of the ESL student. Teachers with ESL training were especially positive about teaching ESL students. The more exposure teachers have to multicultural training, ESL training, and working with diverse ESL students, the more positive teachers become about working with them (Youngs and Youngs., 2001).

Hite and Evans (2006) in their article about mainstream teachers and additional accommodations for ELL students stress the need to watch the use of idioms by teachers. They cited a story about the book Charlie and the Chocolate Factory when grandfather says to Charlie, “You must be pulling my leg. You didn’t find the golden ticket” (p.5). Even though now in a mainstream classroom, this demonstrated the difficulty ELLs have in understanding idiomatic language and the need for teachers to be sensitive about them. In the same article, they state that when lesson modifications for ELL’s were made English proficient students also benefitted. Lastly they stated that teachers felt that” ELLs could, and in fact, did achieve” (p.8) regardless if they came from disadvantaged backgrounds.

Lewis-Moreno (2007), wrote that unprepared teachers of ELL students struggled to meet
their needs in the classroom. She went on to state that if teachers didn’t speak the language of the ELL learner they felt they could not teach them. The concern was that students did not understand. She did offer some program ideas such as summer enrichment programs to develop second-language along with content. She went on to say that students can become engaged via reading partner programs. Lewis-Moreno pointed out that it is a school wide responsibility to accept success of the ELL population. Specifically she stated that “administrators and teachers must accept that there are no short cuts to acquiring a second language” (p.773). She continued by stating that it is crucial for the ESL teacher and mainstream teacher to work together. She also wrote that text length did not correspond to level of difficulty. She wrote that math textbooks may contain fewer words but put forward more theoretically difficult concepts. She further wrote that reading scaffolding instruction should be a strategy chosen carefully with attention to the student’s level of aptitude. Her conclusions said that teachers need the best quality training to become skilled at preparation and delivery of instruction in order to move the second-language learner into the mainstream classroom.

Assessing English for speakers of other languages (ESOL) was the primary focus of research done by Abrams, Fergusson, and Lund (2001). Their focus dealt with the ESOL teacher and how they assessed whether they had learning difficulties and how to distinguish ESOL issues from them. The study found that formal testing was inadequate. They found that one of the major problems was in translating the test which affected its validity. Also cited were developmental history, psychological issues, prior educational experience, and the cultural experience of the student. Their research revealed that there may have been no past history of learning problems in their native language. When learning a second language difficulties were
prevalent. They went on to describe the outcome of a student who attended an English immersion school in her non-English-country. The student had extensive exposure to English but still had limited vocabulary and written skills in English. A students’ cultural experience was also discussed. A focus on conflict between family and school caused her to be limited in her English learning. In their conclusions Abrams, Fergusson, and Lund (2001) stated “the answers are best sought through cooperative efforts” (p.64). They concluded that ESOL teachers and other educators need to have greater collaboration.

More strategies and practice ideas

Kaufman and Brooks (1996) wrote in their research about the need for collaboration in teacher education using a constructivist methodology. In their study they acknowledged a need for collaboration between ESOL teachers and those teachers of other subject areas for any effective education of language minority students to take place. Kaufman and Brooks (1996) wrote that language minority students have between 7 and 11 years to acquire academic language proficiency just to reach native speakers norms in academic achievement. They continued by saying that Hispanics score below the national norm in math and science which may have led them to avoid careers in this area. In this article, Kaufman and Brooks wrote of the benefits of integrated curricula for such students. An area they wrote of was constructivist pedagogy which focuses on active inquiry. They described the constructivist classroom as one that uses manipulative in cooperative settings, framing tasks with predictions, allowing student thinking to drive lessons, using open-ended questions and encouraging students to ask questions, and engaging students in experiences. They wrote that the constructivist classroom should provide time for students to construct meaning. In their conclusions they stated that adults from diverse
backgrounds should work together to solve "interdisciplinary, meaningful problems" (p.247). Lastly, they went on to say that "the classroom provides a natural context for growth and development of all participants - those who speak English fluently, those who are learning the language, those who are teaching, and those who are learning" (p.247).

Medina-Jerez, Clark, Medina, and Ramirez-Marín wrote that "teachers should give students the responsibilities of presenting their ideas to the class in their chosen modalities, including nonverbal signs such as gestures, facial expression, and other symbolic representations such as maps and graphs" (p.54). Their study targeted the ELL student and science.

Research by Settlage, Madsen, and Rustad (2005) referred to the disparity in science achievement between various cultural groups. They went on to speak of the differences in the way science is learned by students from various cultural groups. Further on in their findings they wrote of "Inquiry-Based Science Teaching" (p.45). They briefly described this approach to the ELL student as describing a science question, explaining the task they would explore, show what equipment that would be used, then allow the children to investigate. They expressed the need for more reflective and purposeful preparation by the teacher. They continued by stating that this inquiry-based approach enhanced ELL students learning. Settlage, Madsen, and Rustad, went on to say that the ELL students were encouraged to explore new options and begin to think critically about what they saw. Lastly, they stated that "the learning we noted among these second graders will reveal itself on standardized science tests is based largely on faith; where there is empirical support for this confidence remains untested" (p. 54). They closed with remarks saying that if English language learners are accommodated for their culture and background it could lead to success in science.
Additional literature by Harklau (1994) directly addressed one of the main points of this review. "What do students lose and gain in their transition from ESL to the mainstream (p. 241)?" She wrote that mainstreaming provided rich interaction and purposeful transmission of school subject matter. On the other hand, few opportunities were offered for extended interaction and the non-native speaker perceived a barrier between themselves and native speakers.

Watts-Taffe and Truscott (2000) in their research wrote about what was known about the development of English as second language (ESL) students in the mainstream classroom. Once in the mainstream classroom, vocabulary development is crucial for the second language learner (Watts-Taffe & Truscott, 2000). In this article the use of scaffolding was discussed as a way for the mainstream teacher to assist students in being successful at task completion. Areas such as background knowledge, vocabulary development and communication, are all part of the scaffolding instruction. They state that mainstream classroom teachers receive a small amount of information, schooling, or assistance for working with ESL students. They went on to say that not only did ESL students face the issue of learning a new language but also the difficulty of learning a new culture. Watts-Taffe and Truscott continued by saying that learning English is a "lifelong process for all of us, even those of us for whom English is the native language" (p.260). According to their research, background knowledge aids in meaning for ESL students and that teachers should be aware of the parallel aspects in English. They add, "Care should be taken not to reject answers that appear on the surface to be incorrect" (p.262). Also noted was vocabulary development being crucial for helping ESL students in becoming involved with text. In their conclusions they stressed the need for ESL students to have the same opportunities for language
growth as native English speaking students. They concluded that what was lacking in elementary school classrooms are thoughtful discussions, vocabulary teaching, and a framework to support the ESL student.

Sharkey and Layzer (2000) did a qualitative case study investigating the role of teachers’ practices that may aid or hinder English language learners’ (ELL's) success. This study was done in the context of a secondary school. They approached the study with interest in knowing more about the mainstream teachers’ beliefs and attitudes towards ELLs in their classroom. Their overarching question research question was: “How do teachers’ attitudes, beliefs and practices about ELLs influence ELLs access to academic resources and success in mainstream classrooms” (p.353)? They focused the study on the role of those teachers and how they shaped ELL’s classroom learning experiences. They went on to say that they threw out the idea that any research project can claim impartiality. Sharkey and Layzer wrote of those ESL students in mainstream courses who would come to an ESL room during free periods to get help with their schoolwork. They found that those students, including those that had transitioned out of the ESL program, came to this room just to be in welcome surroundings. The students’ felt it was like a home where they could see their friends. Sharkey and Layzers’ preliminary findings found that teachers’ practices affected ELL’s success three ways: the placement of ELL’s in mainstream classrooms, expectations by these teachers, and interaction in the classroom by the ELL’s. In their writing they state that teachers felt ELLs would feel more comfortable in lower track classes. They went on to state that this failed as a strategy. The “ELLs tended to be isolated or overlooked in their classes” (p.359) and that these lower track classrooms held back their learning of English by limiting their opportunity to connect with other language speakers.
Continuing, they wrote that teachers only expected the ESL student to simply do their homework and ask questions if they did not understand in order to pass the class. Sharkey and Layzer (2000) wrote that mainstream teachers only needed to see effort from the ELLs to be successful. According to Sharkey and Layzer (2000), "In this respect, the teachers' attitudes reflect core values in U.S. society: attributing individual success to personal effort and hard work" (p.359). Regarding classroom interaction, they wrote that ELLs rarely spoke or were spoken to when in the mainstream classrooms. They wrote that this lack of interaction in the mainstream class limited academic success. In their closing remarks for the study they said there were no quick fixes. Sharkey and Layzer stated "One crucial issue, then, is who defines success for these students, how that success is defined, and what the consequences of such definitions are" (p.365). They concluded that the entire school community is needed to better understand the needs of the ELLs student and what strategies to implement.

**Summary**

The literature seemed to acknowledge the same points for both pre-mainstream and mainstream. Overall it called for better teacher preparation, both pre-service and in service (Artiles & McClafferty, 1998). In addition, findings stated that non-mainstreamed student groups failed to achieve academic success to the same levels as those mainstreamed (Pucell-Gates, 2000). To better develop the ESL student in the mainstream classroom, language should be used in meaningful ways (Watts-Taffe & Truscott, 2000). Teachers having positive attitudes toward ESL students are those that not only have had ESL training, but have been exposed to the multicultural aspects of the ESL student (Youngs, et al., 2001). A common theme in the literature was the limited findings of what new, if any, needs the ESL student had once they were
in the mainstream classroom. Inquiries focused on what had taken place with the ESL student that was now in a classroom that no longer accommodated them with ESL teaching methods and strategies. Overall the literature may be seen as inconclusive in finding out whether learning in a classroom with native speakers and non-ESL teacher became an asset or impedance. What continued to be stated in the literature whether abstractly or directly, was the need to have more research on the topic of the transitioned ESL student. The literature gave information on what was not being done and what should possibly be done to better serve these students. Taken together, these literature reviews suggest that collaboration in many areas would seem to be the best avenue to take for all educators of ESL students.
Methodology

The study took place in an urban elementary school located in Western New York. The manuscript used qualitative methods for the majority of the research. Information and data was obtained over a two year period while school was in session. The total number of students from which the data was gathered was five. These students began in a third grade Learning through English Academic Program (LEAP) classroom, transitioning to a fourth grade general education, or mainstream classroom. LEAP students come from families where little or no English is spoken at home. To the best of my knowledge the LEAP acronym is unique to this school district. I have not found any such reference or use of the LEAP acronym in the literature done for this study. The research focused on vocabulary impact on understanding questions by non-native speakers. These English as second language (ESL) students were asked math lesson questions that were not in their native language. The data came from everyday lessons and assessments. Initially these students were given math word problems as part of the everyday curriculum while in the third grade LEAP classroom. They were provided accommodations that native speakers did not receive. For the comparative part of the study, data was gathered from fourth grade math problems these same students were asked to solve after transitioning into the general education classroom. The math curriculum is different at the fourth grade level but the vocabulary words and sentence structure used in the word problems being analyzed for this study were essentially the same. Additional secondary data came from state math tests taken at the third and fourth grade level.
Participants

The subjects consisted of five ESL students all who were previously in the same third grade LEAP class. They later transitioned into a fourth grade general education classroom. The participants were two female students one of Puerto Rican ethnicity, the other from the Dominican Republic. Both were born in the United States. The other three participants were males. One student from a Ukrainian family who was born in the United States, the second male student was born in Liberia and came to the United States when he was four years old. The final male subject was born in the United States and is also Puerto Rican. Their ages ranged between nine and ten years old with only a few months differences in birthdays. They originally were in a class composed of 15 third grade LEAP students. The current general education classroom that they attend totals 25 students. Ninety-two percent of this class is minority students. Forty-five percent are African American, forty-one percent are Latino, seven percent Caucasian, the remaining are the previously mentioned students from Ukraine and Liberia.

Measures

Data was used from past lesson assessments obtained from these students while they attended third grade LEAP. Similar assessment formats were used in the fourth grade general education classroom to which these students transitioned. This was the comparative data being examined. When considered necessary, additional comparative data was introduced from secondary sources of similar studies done by other researchers.
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Procedure

Tests, lesson activities, student observation notes and records kept on these students were assembled. Student samples from their work in third grade were examined first. From these samples, vocabulary terms and phrases that were used in word problems were noted and recorded. Data was then used from the students’ work in fourth grade where these same vocabulary words and phrases were found in math problems. New York State test scores in math were noted for each child. The level at which they scored was used as a baseline tool. New York State test results were first examined and recorded when these students took the tests while a member of the third grade LEAP classroom. Data from the fourth grade New York State testing was then obtained to compare the previous year’s score. New York State testing data from the entire class included native language English speakers. Analysis was then done of these third grade LEAP students using all the available data, both New York State tests and daily lesson documentation and assessment. Their achievement at that level along with how they showed progress or lack of progress when transitioned into mainstream classrooms without previously given accommodations was noted. When all the data was examined, those areas that were impacted by the transitioned student into a general, mainstream, classroom as opposed to the former LEAP classroom was discussed and conclusions were offered.

Accommodations

LEAP accommodations for these ESL students came in the form of extended time for lessons, class pull-out during the normal school day to attend separate classes with an English Speakers of Other Languages (ESOL) teacher, extended time for the mandated New York State
testing, and a focus on illustrating rather than just attempting to explain solutions to word problems with numbers and/or words. These accommodations were only available in the third grade LEAP classroom.
Results

To determine the impact of the study it was necessary to first look at the ESL student’s sample work from third grade prior to transitioning to a fourth grade, general education, mainstream classroom. One aspect of the literature stated that vocabulary and language skills were a definite factor in the ELL students’ growth and understanding. (Schirmer, et al., 1996). The work of the five students used in this study was taken from in-class activities, assessments, and homework. When examining the students’ work, the primary focus was on the vocabulary used in math word problems. High frequency words and phrases such as arrays, choice, cluster, comparison, different ways, factor, fair shares, identify, landmark, related, strategy, and symmetry, which are regularly used in math word problems, reflected only a small sample of the words that the ELL student struggled with when they initially read the question. For this study the following word samples were used: array, cluster, factor, fair shares, and landmark. They were singled out because of their usage in both third grade LEAP and fourth grade mainstream math classes.

Third Grade

When the cited sample words were included in the word problems, all five ELL students had difficulty recognizing these words as descriptive parts of the way to solve the math problem. Prior to receiving the question as a form of student assessment, each word was explained and modeled by the teacher in the context of the math lesson. Nonetheless, each student did not connect with the word as a part of the descriptive need to find a solution. Simply put, the ELL student stumbled or simply ceased to attempt solving the problem. These problems were
normally given in the form of three like questions with differing number challenges. For example, “what are the factors of 100?” If given in only a number problem such as “what numbers times themselves can add up or equal 100?” or, “10 x ? = ?” the students quickly understood. When using any of the sample words chosen for the study, (factor, for example) it became a roadblock to these students. When asked to identify what would be a fair share the students again were stumped by what fair share meant. To reiterate, prior to the actual mathematical calculating aspect of the activity, these vocabulary words were addressed and explained in the lecture part of the lesson in an effort to seek understanding and show their meaning. Even with this instruction, our student subjects failed to comprehend the vocabulary word’s purpose in the math word problem. In other activities during math time, students were sometimes offered “choice” time. This activity gave smaller heterogeneous groups the opportunity to choose different math activities during lesson time. Again, the understanding or concept of choice was barely understood. Students were given choices. The choices were a math game, use of manipulatives to solve problems, or showing how they solved a problem via illustrations or drawings. Even though encouraged to do to students did not make and independent choice. The activity choices were made by the teacher. When another of the math vocabulary words, cluster, was used in a problem, all five students had limited understanding of what was being asked in the question. They were unsure or confused and did not know that the word cluster was necessary in solving the problem. The students also had tremendous difficulty in comparing different problems and numbers when these words were included. When the word landmark was part of a word problem it continued to cause confusion with the students’ even though modeled and explained during lesson time. Tables 1,2,3,4,5, illustrates the samples taken
Transitioning of the ESL

from class work, targeted assessment, and homework. Each area indicated in parentheses dealt with a math lesson topic on **arrays, clusters, factors, fair shares** (fractions), and **landmark** numbers. An **array** is the term used when arranging numbers or illustrating them with drawings used toward solving a word problem. **Clusters** are a series of number problems usually done with multiplication. A **cluster** uses smaller two digit numbers times two digit numbers to solve more complex problems. **Factors** was the ability to take a number, such as 12, for example and find its factors, which are 1,2,3,4,and 6. **Fair shares** were about fractions. Lastly, **landmark** numbers is best described as those numbers that help in finding solutions to a problem. 100 would be a **landmark** number used in skip counting to 1000. The categories are explained in the note portion of the table. The data contained in the tables represents samples taken from the students work using the cited vocabulary words. Students were at a loss with math word problems that used these vocabulary words. Even though they were given instruction and modeling of the vocabulary words during lesson time, the students failed to understand their meaning in word problems. However, when students were given problems illustrating the problems such as arrays, they easily knew what was required to find a solution. The same was true when the students only had numbers to work with. In Tables 6,7,8,9,10, these same terms and categories are used with data gathered from fourth grade work. Fourth grade work is further addressed in the upcoming subheading, **Fourth grade**.

On a positive note, if given the opportunity to use a manipulative or **hands on** application in solving a **symmetry** problem, 4 out of the 5 students using pattern blocks could demonstrate
symmetry when verbally requested to do so. The same could be said when they were told to draw or illustrate their answers to questions dealing with symmetry. However, when they were asked in a written word problem to “show the symmetry” of the geometric figures in a problem, they were unable to recall the meaning of symmetry or understood what they were being asked to solve. Tables 11, 12, 13, 14, 15, illustrates fourth grade, hands on, work. During this study significant samples from ESOL student’s prior work from third grade was not available.

To recap, all of the aforementioned occurred while these students were in a third grade ESOL class. It is important to continue to emphasize that these students were given the special education accommodations of ELL students. Despite these adaptations and modifications, the issue of vocabulary remained an ongoing focus that was needed to better help the ELL student interpret and understand math word problems.

Fourth grade

In the next part of the study these same five students had transitioned to a fourth grade, general education, mainstream classroom. It is important to note again that these students no longer received the special accommodations they received as third grade LEAP students, even though they will remain ELL students in every sense of the word. It is also important to note that even though the math word problems were slightly more complex in the fourth grade, the earlier cited vocabulary words are still used with word problems. In examining the sample words chosen, the results from ELL students now in a mainstream, this fourth grade class was only slightly better in correctly answering math word problems. To better exemplify the minimal differences, rather than asked to answer questions about “landmarks in the hundreds”, a third
grade question, students that were now in the mainstream fourth grade were given the question based on “landmarks in the thousands”. (landmarks again refers to numbers such as 10, 20, etc. that students use to anchor or connect to solve more complex problems). In each of the high frequency words chosen that were being used in fourth grade, only slightly better success was found. The homework category showed marginal improvement. This may or may not be due to parental assistance at home, or on the positive side, some actual understanding of these words took place. The in-class assessments were more authentic and this segment of data appears to be more accurate.
Discussion and Conclusion

The results of this study related to the literature, but only in fragments. Some of the literature examined ELL students before going into a mainstream classroom. It then looked at what gains took place in that classroom. The studies cited earlier in the review of literature only dealt with ELL students outside the mainstream. Studies dealing directly with ELL students when they are moved into the general education class were not found or non-existent. When comparing to the literature, this study points toward a need for students to spend a longer time in the accommodating ESOL class before being mainstreamed. An actual time frame may never be arrived at based on the differing needs of the students. None of the literature offers any actual time frames to use as a part of the criteria for placement. The literature offered theories that possibly some arbitrary number should be used for the number of years an ESOL student stays in such a classroom. This study only looked at the results of students based on the change from third grade ESOL to a fourth grade mainstream, general education classroom. A more concise and larger time span in examining such students would offer more understanding. Following students from year to year for more than one year, as was done for this study, would hopefully reveal more and provide better comparisons. From the sample data used in this study, it appears that no significant improvement occurred when the ELL student transitioned to the mainstream classroom. Additional conclusions seem to indicate that the lack of ELL accommodations did not greatly impact learning and understanding. A hypothesis could be brought forth that with a continuation of these special accommodations the ELL student would show improvement. If this took effect then the classroom may no longer be described as mainstream. Limitations to consider were that these students were only observed during the third grade, 180 day elementary
school year. Granted, summer recess is not a normal classroom time but may possibly be considered as an additional variable. Year round observation might reveal different results. From this study the break during summer appears to foster a decreased learning environment. It should also be noted that the ELL students in this study returned to an environment of their own language and culture. The limited exposure to English vocabulary when not in school greatly impacts the ELL’s progress. Lack of continuing additional accommodations also may have impacted the students’ learning. Another limitation during this study was that data for the fourth grade was collected up until the eight month of the school year. The full ten month district wide school year is the norm. This probably had little bearing on the results. Finally, the decision and timing to place these students into the mainstream classroom may not have been beneficial for these students. As cited in the literature by Lewis-Moreno (2007) “administrators and teachers must accept that there are no short cuts to acquiring a second language”. (p.773) Choosing the correct time to arbitrarily take the student from the ELL classroom may be the most serious limitation of them all. Harklau (1994) wrote “What do students lose and gain in their transition from ESL to the mainstream (p. 241)?” From the data used in this study their appears to be no significant gain.

The final analysis may offer the simple premise that moving the ELL student to the mainstream class is something requiring much more study than currently seems available. What must be considered is the criteria used on when and what students should be transitioned. Since this study only looked at the students in a “before and after” aspect, additional studies need to be done on the gauge used to justify such a transition.
References


Gwyn-Paquette, C. (2002). The role of reflective conversations and feedback in helping
pre-service teachers learn to use cooperative activities in their second language


learners. *Journal of Adolescent & Adult Literacy, 48*, 152-162.


accommodating the needs of English language learners. *Teacher Education Quarterly, 33*(2),
89-108.

Medina-Jerez, W., Clark, W., Medina, A., & Ramirez-Marin, F. (2006) Science for ELL’s:
Rethinking our approach. *The Science Teacher, 74*, 52-56

constructivist approach. *TESOL Quarterly, 30*, 231-251


APPENDIX A. "LANDMARKS" IN THE HUNDREDS

Jumping on the 100 Chart

1. Frogurt started on 52 and jumped to 100 on your 100 chart. How many jumps did he make? How can you prove it? Tell how you figured this out. You can use words or pictures.

The number 52 is not a landmark so I will write it.

2. Frogurt started on 28 and jumped to 103. How many jumps did he make? How can you prove it? Tell how you figured this out. You can use words or pictures.

I took 75 jumps to make 1 to 103.
Finding Factors

Choose a new number. Find the factors of your number using strategies and ideas we talked about in class. Write about the strategies you used and any new patterns you discovered.

My number is 72.

Its factors are 1, 2, 3, 4, 6, 8, 9, 12, 18, 24, 36, 72.

Strategies I used to find the factors:

- Add 72 plus 72 and it was 144 and that is a factor of 72. It also counted by 2.

Patterns I noticed:

- The pattern I noticed was by counting by 72, and 2.

   --
Multiplication Clusters

Solve the first two problems in each cluster. Then use those problems to help you solve the last problem. If you think of another problem that helps you solve the last problem, add it to the cluster.

\[
\begin{array}{ccc}
4 \times 4 & 8 & 12 \\
\times 4 & \times 4 & \times 4 \\
16 & 32 & 48 \\
\end{array}
\]

\[
\begin{array}{ccc}
7 \times 2 & 8 & 9 \times 2 \\
\times 2 & \times 2 & \times 2 \\
14 & 16 & 18 \\
\end{array}
\]

\[
\begin{array}{ccc}
5 \times 6 & 6 \times 6 & 7 \\
\times 6 & \times 6 & \times 6 \\
30 & 36 & 42 \\
\end{array}
\]

\[
\begin{array}{ccc}
3 \times 5 & 10 & 12 \\
\times 5 & \times 5 & \times 5 \\
15 & 50 & 60 \\
\end{array}
\]

\[
\begin{array}{ccc}
9 \times 3 & 9 \times 6 & 9 \times 12 \\
\times 3 & \times 6 & \times 12 \\
27 & 54 & 108 \\
\end{array}
\]
Who Gets the Larger Share? (page 1 of 2)

1. Group A: 3 people share 5 brownies.
   Group B: 2 people share 5 brownies.
   Who gets the larger share? ____________________________
   Tell how you decided. Use words or drawings or both.

2. Group C: 6 people share 4 brownies.
   Group D: 3 people share 2 brownies.
   Who gets the larger share? ____________________________
   Tell how you decided. Use words or drawings or both.
I have 48 automobiles in my shop. I have 4 rows of automobiles. How many cars, trucks, trailers, and vans will be in each row?

<table>
<thead>
<tr>
<th>cars</th>
<th>trucks</th>
<th>trailers</th>
<th>vans</th>
</tr>
</thead>
<tbody>
<tr>
<td>car</td>
<td>truck</td>
<td>trailer</td>
<td>van</td>
</tr>
<tr>
<td>car</td>
<td>truck</td>
<td>trailer</td>
<td>van</td>
</tr>
<tr>
<td>car</td>
<td>truck</td>
<td>trailer</td>
<td>van</td>
</tr>
<tr>
<td>car</td>
<td>truck</td>
<td>trailer</td>
<td>van</td>
</tr>
<tr>
<td>car</td>
<td>truck</td>
<td>trailer</td>
<td>van</td>
</tr>
<tr>
<td>car</td>
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<td>trailer</td>
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<td>trailer</td>
<td>van</td>
</tr>
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<td>truck</td>
<td>trailer</td>
<td>van</td>
</tr>
<tr>
<td>car</td>
<td>truck</td>
<td>trailer</td>
<td>van</td>
</tr>
</tbody>
</table>

There will be 12 in each row.
Table 1.

<table>
<thead>
<tr>
<th>Student</th>
<th>Class work</th>
<th>Assessment</th>
<th>Homework</th>
</tr>
</thead>
<tbody>
<tr>
<td>(array)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A</td>
<td>0/3</td>
<td>0/3</td>
<td>1/5</td>
</tr>
<tr>
<td>B</td>
<td>0/3</td>
<td>0/3</td>
<td>0/5</td>
</tr>
<tr>
<td>C</td>
<td>1/3</td>
<td>1/3</td>
<td>1/5</td>
</tr>
<tr>
<td>D</td>
<td>0/3</td>
<td>0/3</td>
<td>0/5</td>
</tr>
<tr>
<td>E</td>
<td>1/3</td>
<td>1/3</td>
<td>2/5</td>
</tr>
</tbody>
</table>

Notes: Vocabulary word is in parentheses; 0/0 represents number of correct answers out of questions given per category.
Table 2.

Third grade LEAP data

<table>
<thead>
<tr>
<th>Student (cluster)</th>
<th>Class work</th>
<th>Assessment</th>
<th>Homework</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>1/3</td>
<td>1/3</td>
<td>2/5</td>
</tr>
<tr>
<td>B</td>
<td>1/3</td>
<td>1/3</td>
<td>1/5</td>
</tr>
<tr>
<td>C</td>
<td>0/3</td>
<td>0/3</td>
<td>1/5</td>
</tr>
<tr>
<td>D</td>
<td>1/3</td>
<td>1/3</td>
<td>1/5</td>
</tr>
<tr>
<td>E</td>
<td>1/3</td>
<td>1/3</td>
<td>1/5</td>
</tr>
</tbody>
</table>

Notes: Vocabulary word is in parentheses; 0/0 represents number of correct answers out of questions given per category.
### Table 3.

#### Third grade LEAP data

<table>
<thead>
<tr>
<th>Student</th>
<th>Class work</th>
<th>Assessment</th>
<th>Homework</th>
</tr>
</thead>
<tbody>
<tr>
<td>(factor)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A</td>
<td>0/3</td>
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<td>0/5</td>
</tr>
<tr>
<td>B</td>
<td>0/3</td>
<td>0/3</td>
<td>0/5</td>
</tr>
<tr>
<td>C</td>
<td>1/3</td>
<td>1/3</td>
<td>1/5</td>
</tr>
<tr>
<td>D</td>
<td>0/3</td>
<td>0/3</td>
<td>0/5</td>
</tr>
<tr>
<td>E</td>
<td>0/3</td>
<td>0/3</td>
<td>0/5</td>
</tr>
</tbody>
</table>

**Notes:** Vocabulary word is in parentheses; 0/0 represents number of correct answers out of questions given per category.
Table 4.

<table>
<thead>
<tr>
<th>Student</th>
<th>Class work</th>
<th>Assessment</th>
<th>Homework</th>
</tr>
</thead>
<tbody>
<tr>
<td>(fair shares)</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>A</td>
<td>1/3</td>
<td>1/3</td>
<td>1/5</td>
</tr>
<tr>
<td>B</td>
<td>0/3</td>
<td>0/3</td>
<td>0/5</td>
</tr>
<tr>
<td>C</td>
<td>1/3</td>
<td>1/3</td>
<td>1/5</td>
</tr>
<tr>
<td>D</td>
<td>0/3</td>
<td>0/3</td>
<td>0/5</td>
</tr>
<tr>
<td>E</td>
<td>0/3</td>
<td>0/3</td>
<td>0/5</td>
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</tbody>
</table>

Notes: Vocabulary word is in parentheses; 0/0 represents number of correct answers out of questions given per category.
Table 5.

Third grade LEAP data

<table>
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<tr>
<th>Student</th>
<th>Class work</th>
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<th>Homework</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(landmark numbers)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A</td>
<td>1/3</td>
<td>1/3</td>
<td>1/5</td>
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<tr>
<td>B</td>
<td>1/3</td>
<td>0/3</td>
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<tr>
<td>C</td>
<td>0/3</td>
<td>1/3</td>
<td>1/5</td>
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<tr>
<td>D</td>
<td>1/3</td>
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<td>0/5</td>
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<tr>
<td>E</td>
<td>1/3</td>
<td>0/3</td>
<td>0/5</td>
</tr>
</tbody>
</table>

Notes: Vocabulary word is in parentheses; 0/0 represents number of correct answers out of questions given per category.
Table 6.

Fourth grade, general education data

<table>
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<tr>
<th>Student</th>
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<th>Assessment</th>
<th>Homework</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>1/3</td>
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<td>2/5</td>
</tr>
<tr>
<td>B</td>
<td>1/3</td>
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<td>2/5</td>
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<tr>
<td>C</td>
<td>1/3</td>
<td>1/3</td>
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<td>D</td>
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</tbody>
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Notes: Vocabulary word is in parentheses; 0/0 represents number of correct answers out of questions given per category.
Table 7.

<table>
<thead>
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<th>Student</th>
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<td>B</td>
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<td>1/3</td>
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<td>1/3</td>
<td>1/3</td>
<td>1/5</td>
</tr>
</tbody>
</table>

Notes: Vocabulary word is in parentheses; 0/0 represents number of correct answers out of questions given per category.
### Table 8.

**Fourth grade, general education data**

<table>
<thead>
<tr>
<th>Student</th>
<th>Class work</th>
<th>Assessment</th>
<th>Homework</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>0/3</td>
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<tr>
<td>B</td>
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<td>C</td>
<td>1/3</td>
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<tr>
<td>E</td>
<td>1/3</td>
<td>1/3</td>
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</tbody>
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**Notes:** Vocabulary word is in parentheses; 0/0 represents number of correct answers out of questions given per category.
### Table 9.

Fourth grade, general education data

<table>
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<tr>
<th>Student</th>
<th>Class work</th>
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<th>Homework</th>
</tr>
</thead>
<tbody>
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<td>(fair shares)</td>
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<td></td>
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<tr>
<td>A</td>
<td>1/3</td>
<td>1/3</td>
<td>1/5</td>
</tr>
<tr>
<td>B</td>
<td>0/3</td>
<td>0/3</td>
<td>0/5</td>
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<tr>
<td>C</td>
<td>1/3</td>
<td>1/3</td>
<td>1/5</td>
</tr>
<tr>
<td>D</td>
<td>0/3</td>
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</tr>
<tr>
<td>E</td>
<td>0/3</td>
<td>0/3</td>
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</tr>
</tbody>
</table>

Notes: Vocabulary word is in parentheses; 0/0 represents number of correct answers out of questions given per category.
Table 10.

<table>
<thead>
<tr>
<th>Student</th>
<th>Class work</th>
<th>Assessment</th>
<th>Homework</th>
</tr>
</thead>
<tbody>
<tr>
<td>(landmark numbers)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A</td>
<td>1/3</td>
<td>1/3</td>
<td>2/5</td>
</tr>
<tr>
<td>B</td>
<td>1/3</td>
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<tr>
<td>C</td>
<td>1/3</td>
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<tr>
<td>D</td>
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<tr>
<td>E</td>
<td>1/3</td>
<td>0/3</td>
<td>0/5</td>
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</tbody>
</table>

Notes: Vocabulary word is in parentheses; 0/0 represents number of correct answers out of questions given per category.
Table 11.

<table>
<thead>
<tr>
<th>Student</th>
<th>&quot;hands on: work&quot;</th>
<th>Illustrated (or drawn by the student)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
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<td>3/3</td>
</tr>
<tr>
<td>B</td>
<td>3/3</td>
<td>3/3</td>
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<tr>
<td>C</td>
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<td>1/3</td>
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<tr>
<td>D</td>
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<tr>
<td>E</td>
<td>2/3</td>
<td>1/3</td>
</tr>
</tbody>
</table>

Notes: The data shown here came from "hands on" (use of manipulatives) experience in solving problems. 0/0 represents the number of correct answers to questions given per category. These results came from in-class activities only. Observation by the teacher and illustrations provided by the student were the means used for assessment. In parentheses are the types of associated vocabulary with the problem.
### Table 12.

**Fourth grade, general education," hands on" data**

<table>
<thead>
<tr>
<th>Student</th>
<th>&quot;hands on: work&quot;</th>
<th>Illustrated (or drawn by the student)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(cluster)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A</td>
<td>2/3</td>
<td>2/3</td>
</tr>
<tr>
<td>B</td>
<td>2/3</td>
<td>3/3</td>
</tr>
<tr>
<td>C</td>
<td>3/3</td>
<td>1/3</td>
</tr>
<tr>
<td>D</td>
<td>3/3</td>
<td>1/3</td>
</tr>
<tr>
<td>E</td>
<td>3/3</td>
<td>2/3</td>
</tr>
</tbody>
</table>

**Notes:** The data shown here came from "hands on" (use of manipulatives) experience in solving problems. 0/0 represents the number of correct answers to questions given per category. These results came from in-class activities only. Observation by the teacher and illustrations provided by the student were the means used for assessment. In parentheses are the types of associated vocabulary with the problem.
Table 13.

<table>
<thead>
<tr>
<th>Student (factor)</th>
<th>&quot;hands on: work&quot;</th>
<th>Illustrated (or drawn by the student)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>1/3</td>
<td>2/3</td>
</tr>
<tr>
<td>B</td>
<td>2/3</td>
<td>2/3</td>
</tr>
<tr>
<td>C</td>
<td>1/3</td>
<td>1/3</td>
</tr>
<tr>
<td>D</td>
<td>1/3</td>
<td>2/3</td>
</tr>
<tr>
<td>E</td>
<td>1/3</td>
<td>2/3</td>
</tr>
</tbody>
</table>

Notes: The data shown here came from "hands on" (use of manipulatives) experience in solving problems. 0/0 represents the number of correct answers to questions given per category. These results came from in-class activities only. Observation by the teacher and illustrations provided by the student were the means used for assessment. In parentheses are the types of associated vocabulary with the problem.
### Table 14.

**Fourth grade, general education, "hands on" data**

<table>
<thead>
<tr>
<th>Student</th>
<th>&quot;hands on: work&quot;</th>
<th>Illustrated (or drawn by the student)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(fair shares)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A</td>
<td>3/3</td>
<td>3/3</td>
</tr>
<tr>
<td>B</td>
<td>2/3</td>
<td>3/3</td>
</tr>
<tr>
<td>C</td>
<td>3/3</td>
<td>3/3</td>
</tr>
<tr>
<td>D</td>
<td>2/3</td>
<td>2/3</td>
</tr>
<tr>
<td>E</td>
<td>3/3</td>
<td>3/3</td>
</tr>
</tbody>
</table>

**Notes:** The data shown here came from "hands on" (use of manipulatives) experience in solving problems. 0/0 represents the number of correct answers to questions given per category. These results came from in-class activities only. Observation by the teacher and illustrations provided by the student were the means used for assessment. In parentheses are the types of associated vocabulary with the problem.
Table 15.

Fourth grade, general education, "hands on" data

<table>
<thead>
<tr>
<th>Student</th>
<th>&quot;hands on: work&quot;</th>
<th>Illustrated (or drawn by the student)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>3/3</td>
<td>3/3</td>
</tr>
<tr>
<td>A</td>
<td>3/3</td>
<td>3/3</td>
</tr>
<tr>
<td>B</td>
<td>3/3</td>
<td>3/3</td>
</tr>
<tr>
<td>C</td>
<td>2/3</td>
<td>2/3</td>
</tr>
<tr>
<td>D</td>
<td>2/3</td>
<td>3/3</td>
</tr>
<tr>
<td>E</td>
<td>2/3</td>
<td>2/3</td>
</tr>
</tbody>
</table>

Notes: The data shown here came from "hands on" (use of manipulatives) experience in solving problems. 0/0 represents the number of correct answers to questions given per category. These results came from in-class activities only. Observation by the teacher and illustrations provided by the student were the means used for assessment. In parentheses are the types of associated vocabulary with the problem.