INSTRUCTION OF KEYBOARDING SKILLS: A WHOLE LANGUAGE APPROACH TO TEACHING FUNCTIONAL LITERACY SKILLS TO STUDENTS WHO ARE BLIND AND HAVE ADDITIONAL DISABILITIES.

Mary Stauffer
The Western Pennsylvania School for Blind Children

This article describes an unconventional method to teach un-contracted braille reading and writing skills to students who are blind and have additional disabilities. It includes a keyboarding curriculum that focuses on the whole language approach to literacy. A special feature is the keyboard that is adapted with braille symbols. Un-contracted braille reading is not taught, but is acquired simultaneously while embedding essential concept skills.

Teaching keyboarding skills to students who are visually impaired and have additional disabilities can greatly impact their ability to communicate. When students have the skills to exercise control over their environment, it leads to greater independence, increases self-sufficiency and enhances self-esteem. (Sanspree 1998, Miller & Rash 2001, Hong & Erin 2004), and others support the learning of un-contracted braille for students with multiple disabilities, since reading, even at a functional level, facilitates independence and participation in community settings.

This author was inspired by the research of (MacCuspie 2002, (Mangold, 2000, Herzberg, Stough, and Clark 2004), and others who urge educators to explore other strategies to teach literacy to these students. There is very limited research on the selection of the appropriate reading and writing media for students who are blind and have additional disabilities (Heller, D'Andrea, & Forneyk, 1998 and Koenig and Holbrook, 2000). This paper will demonstrate an unconventional method to teach reading and writing skills to students who are blind and have additional disabilities. Un-contracted braille reading is not taught, but is acquired, simultaneously, while teaching keyboarding.

There are two unique features of this study. The keyboard is adapted with braille symbols; and keyboarding is taught in cooperation with the whole language approach to literacy. Rather than aimlessly tracking lines of unidentified braille characters, students can develop literacy skills merely by learning to type. The whole language approach is extremely beneficial for these students who have difficulty understanding words unless they attach a meaning to the word. According to (Goodman, 2002) whole language instruction focuses on the experiences of the learner as they build concepts and values. Within this approach, the teacher is the curriculum builder. Meaningful lessons are designed as a result of the collaborative efforts of the educational team and significant others in the student's home environment. The educational team determines which skills to target for instruction and the parent(s) and/or guardian(s) share their home and community experiences with the educational team. As a result, the student yields the benefits of learning other important skills and concepts, usually taught in isolation, but embedded into this instructional strategy. This specialized instruction should be provided by a teacher of the visually impaired. According to Hart, Blasch and Welsh, students without vision need help from a specialist to integrate a number of pieces of information in order to develop the concept skills necessary to orient to and understand their environment. The fingers need to be taught to explore and to gather information.

An understanding of the important concepts of spatial awareness, directionality, etc., can be learned while keyboarding. In addition, functional academic skills such as phonics and spelling can be acquired naturally as the student develops a relationship between letter/sound associations to form meaningful words. The

student develops a real understanding of a vocabulary that is based on meaningful lessons and experiences while learning to keyboard.
The Embedded Skills Chart (Table 1) provides examples of skills that may be taught within this instructional approach while using *The Keyboarding Curriculum to Develop Literacy Skills for Students who are Blind and have Additional Disabilities,* developed by the author (Addendum 1 attached).

Table 1
EMBEDDED SKILLS CHART

Orientation	Motor	Self-Esteem	Behavior	Functional Academics
Body Awareness	Posture Control	Confidence	Increase Attending	Spelling
Spatial Relations	Coordination	Pride	Decrease Self-Stimulatory Behaviors	Phonics
Directionality	Manual Dexterity	Environmental Control		Grammar
	Finger Movement			Sentence Structure
	Finger Strength			Paragraph Formation
	Stretching			Functional Story Writing
	Reaching			

It is highly recommended that the student learn to keyboard on an electric typewriter rather than a computer keyboard. The sensitivity of the computer keyboard impedes instruction and sets the student up for failure; however, the auditory feedback produced by the electric typewriter is a powerful and motivating factor. As keyboarding instruction progresses and the student is able to type simple sentences, instruction can be generalized to the computer keyboard. Computer technology will present the student with more opportunities to communicate after they have developed reading and writing skills. Initially, too much reliance on speech technology tends to impede the ability to read for oneself. Technology should not replace the primary mode of reading for those who are tactual learners. When the time is right, independence can be enhanced with the use of a voice synthesizer, such as IntelliTalk. This affords the instructor with opportunities to teach self-correction techniques and enables the student to self-monitor progress. According to Dutton and Dutton (1990) the rationale for the use of the voice synthesizer is that some students who are not able to see a printed page because of vision problems could *hear* the same page in text, computerized and voiced by the synthesizer. Computer usage may also have a positive side effect for the student who has additional disabilities, since the world at large perceives those who use the computer as smart (Kleitman, Haskell, and Dowling, l985).

A single-case study, *Instruction of Typing Skills Develops Incidental Learning in a Student who is Blind and Multiply Challenged* was presented at the California State University, Northridge Center on Disabilities 1996 *Technology with Disabilities Conference* by this author and Babu. The purpose of the study was to determine if the subject would recognize braille letters, while learning to type on an electric typewriter adapted with braille symbols.

The subject of this four-year, two-phase longitudinal study was a fifteen year-old male with a visual diagnosis of microphthalmia, hypoplastic optic nerve, and concurrent diffuse developmental delays. The Scales of Independent Behavior (SIB) assessment was administered and the results indicated that the subject's broad independent age score was 4 years, 11 months. Since the age of six, attempts were made to teach braille.

Method
During the first phase of the study, prior to keyboarding instruction, baseline was taken on 10 successive school days to determine the subject's knowledge of braille letters. The subject was presented with individual braille letters, flashcard style. An incorrect response was not acknowledged; a correct response

was reinforced with verbal praise. Baseline indicated that the subject consistently recognized four alphabet letters (A, L, N, R), or 15.4%. Criteria were set at 80%, three successive sessions. BRAILLE WAS NOT TAUGHT. Weekly probes were taken to determine if the subject is incidentally learning to read the braille letters while learning to keyboard. No data were taken on criterion letters, (A,L,N,R) but they were included in the weekly probes Each month a number of letters were introduced on the keyboard in relation to the student's accuracy. The subject was taught to keyboard using this author's previously mentioned keyboarding curriculum. Within six months of instruction data reflects that the subject identified all braille alphabet letters with 92% accuracy (see Figure 1).

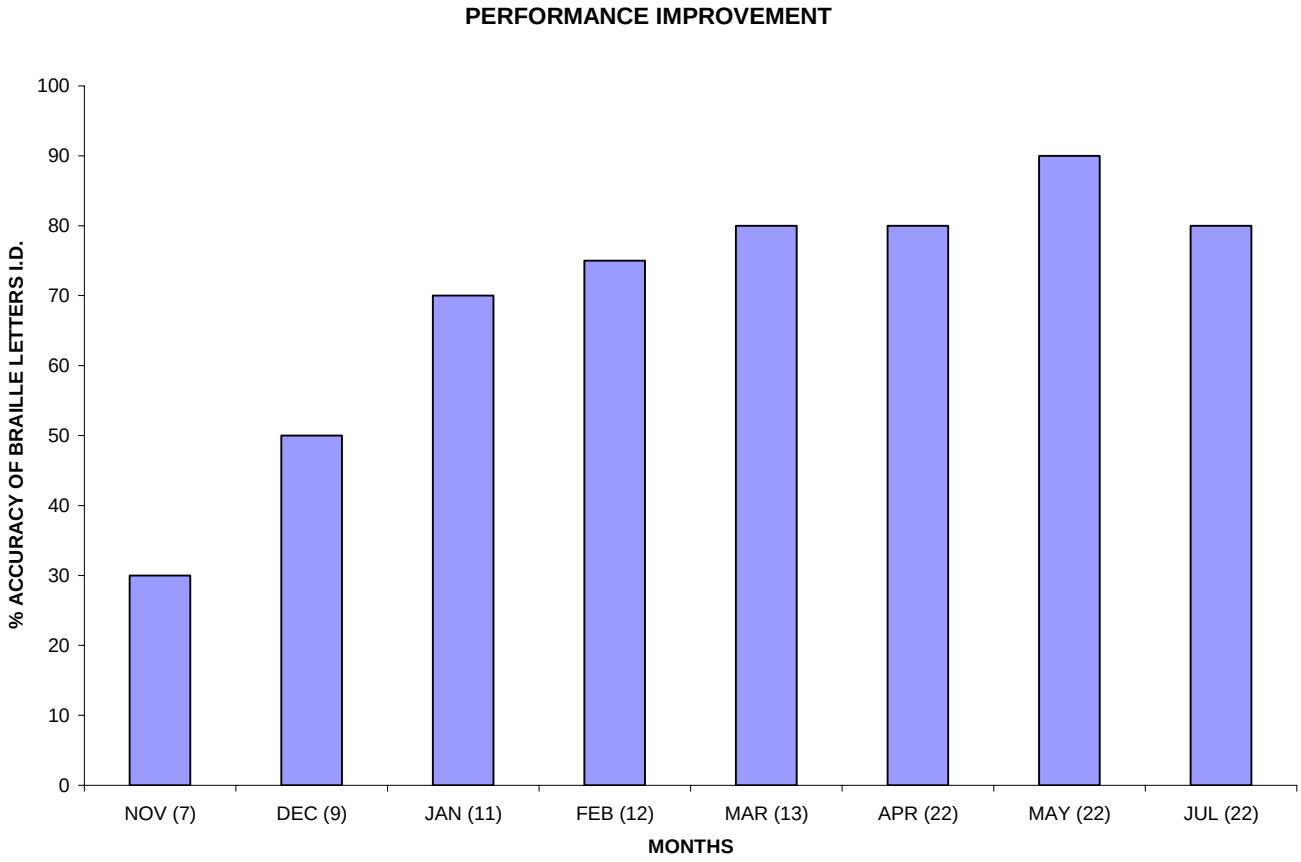

Figure 1

Analysis of Data Phase 1:
From November through March, data were taken on 13 braille letters. In April and May data were taken on the remaining letters. The subject's instruction was interrupted for six weeks and resumed again in July when the subject attended the Extended School Year Program. This may explain the slight decline in improvement during the month of July. Nevertheless, the subject still exceeded the criteria of 80%.

Preface to Keyboarding Instruction:
Teaching the use of the keyboard requires one on one over the shoulder attention using verbal cues and physical prompts. Through the decades, research has demonstrated that the reinforcement cycle of teacher attention and the close proximity of the instructor affect the student's learning. Kleitman, Haskell and Dowling presented a paper (l985) that demonstrates that the reinforcement cycle of teacher attention and approval is usually enough to help the student strive to make correct responses. Dunn (l995) further contends that the degree of emotional motivation is increased by the close proximity of the instructor. Within this milieu, as the student is typing, provide the student with a phonic hint to help the student spell a particular word (Newman and Church, 1990). Exaggerate verbal cues; i.e., salutation –sal/u/ta/tion. According to the Goodman, Critts, and Whitmore study (cited in Mather, l992) most whole language

teachers take their cues for instruction from their students. Student preference for a particular verbal prompt should be utilized. Students may indicate a preference for an alternative instructional prompt. For example, when teaching the use of the SHIFT key, a student may indicate a desire to use the prompt *let up*, rather than *release.* For students who have additional disabilities this is an effective teaching methodology that complements the whole-language experience approach. The teacher takes advantage of the natural opportunities and teaches to the critical moments of instruction.

Analysis of Data Phase 2:
The data analysis will follow; however, charts are not included during *Phase 2* of the study.
As learning advanced, the subject typed ten, 4-6 letter words, each week related to the subject's natural learning environment. The instructor dictated each word, letter by letter, as the subject typed. At this point, in order to determine if the subject could translate braille symbols into a word and interpret its meaning the vision teacher brailled each lesson. Criteria were set at 80% accuracy, 3 successive sessions.

Within four months, the subject progressed from 50% to 90% accuracy and was able to read and understanding ten, 4-6 letter words each week. An analysis of the typing data revealed that most typing errors occurred with spacing between each word and adapting to the touch sensitivity of the keyboard. The subject's braille reading errors were due to cell reversals of letters *D and H* and cell similarity of letters *Q and T*.

Depending upon the progress of each individual student, the instructor decides if instruction should be accelerated to include sentences, paragraphs and functional stories. This subject was introduced to more complex language related assignments. The subject composed and typed ten simple sentences each week to ten vocabulary words that were related to science and social studies lessons. Typing criteria were set at no more than two errors per sentence (including grammar rules, spelling and sentence structure); spelling criteria was set at 90%, three successive sessions. During the following three months typing data progressed from 60% to 80%, and 90% respectively and spelling progressed from 80%, to 90% and 100% respectively.

The following school year the decision was made to introduce the subject to the computer keyboard. Instruction progressed to typing compound sentences, paragraphs, and functional stories. The subject had no problem generalizing to the computer keyboard. Again typing criteria were set at no more than two errors per sentence (including grammar rules, spelling and sentence structure). No data were taken on braille reading since the subject achieved criteria; however he continued to read his typing lessons, brailled by his teacher. Data were taken for six successive school months. The results per month were 60%, 60%, 70%, 80%, 80%, and 100% respectively. The instructional demands of formulating compound sentences and using correct grammar, spelling and sentence structure, in conjunction with typing skills, resulted in slower progress initially; but ultimately it was worth the effort.

The data supports that this unconventional instructional strategy resulted in incidental braille reading for a subject who is blind and has additional disabilities. The subject demonstrated a progression from the knowledge of four braille alphabet letters to reading uncontracted braille at a functional level.

This instructional method to teach un-contracted braille was replicated with five students, with no vision, who were also able to develop reading and writing skills. For these students, un-contracted braille enabled them to have more control over their own environment and to participate more fully in their community. By learning braille literacy skills, they were able to read self-generated grocery lists, recipes, daily schedules, menu items, and label personal and/or food items.

Additionally, four students with functional vision were also taught to type using this same instructional method. These students, however, preferred the *hunt and peck* typing to the traditional method. They were more motivated by the visual attention to the letters. Regardless, their communication options were enhanced and their spelling skills improved. This author is a proponent of further research to promote a unified system of un-contracted braille. The complexity of the braille code makes it difficult for students who have additional disabilities from acquiring an adequate level of literacy. Efforts should be made to simplify the code so they can learn to read at the same pace as their peers. This presents a critical need for

studies to determine the influence of contractions on reading skills, especially during the early years of learning. A resolution from the Braille symposium declared *all registered blind children should have the opportunity to learn braille as early as possible*.

The research on literacy instruction for students for this low incidence population is scarce, costly, but necessary. They must be included in statistics, funding, and have access to specialized services, including literacy instruction from teachers of the visually impaired. A national survey by Wittensteen & Pardee (1996), reports that a decline in braille literacy is attributed to an increase in the number of students with disabilities. The results of this study may have implications for continuing education programs and in-service training so other braille teachers can determine if others who have additional disabilities are able to acquire reading and writing skills. Unfortunately, single case studies are not as relevant to the majority of educators. This creates a dilemma for the vision specialist who must decide whether to invest valuable time to teach or to research. Perhaps, with the thrust for *no child left behind* which was signed into law by President Bush on January 8, 2002, educators of the visually impaired will be encouraged to explore and share other options to develop literacy skills for students with diverse learning needs. This author, along with (Koenig and Holbrook, 2000, The Canadian Braille Authority 2002) and others, concur.

References

Babu, Vasu, and Stauffer, Mary (1996). *Instruction of Typing Skills Develops Incidental Learning in a Student Who is Blind and Multiply Challenged.* Conference Paper (unpublished):at the 11th Annual CSUN Conference: Technology and Persons with Disabilities, Los Angeles, California

Bruininks, R. H., Woodcock, R. W., Weatherman, R. F., & Hill, B. K. (1985) Scales of Independent Behavior. Allen, Texas: DLM Teaching Resources.

Council for Exceptional Children. (1990) December. *Students with severe and profound disabilities. Tech use guide: Using computer technology.* (Report No. C300-87-0015). Reston, Va: Center for Special Education Technology. (ERIC Document Reproduction Service No. ED 339.

Danielson E. & Lamb, G. (1983). Beginning reading/writing for braille or print readers: A teacher's guide to the psycholinguistic viewpoint. Melbourne: Royal Victorian Institute for the Blind. Goodman, K. (1973). The psycholinguistic nature of the reading process. Detroit: Wayne State University Press.

Dunn, et al. (1988). Integrating Computers and Electronic Technology Into The Curriculum For Students With Multiple Handicaps. Iowa Department of Education. Des Moines Independent Community School District. (ERIC Document Reproduction Service No. ED 303 017.

Dutton, Donna H. & Dale, L. (1990). Support Networks for Inclusive Schooling.

In Stainback, William, and Stainback, Susan . (Eds.), *Technology to support diverse needs in regular classes.* (pp.167-186). Baltimore: Paul H. Brookes:

Goodman, Kenneth S. (1992) September. Why whole language is today's agenda in educatiion. *Language Arts,* 69, p. 354-363.

Goodman, Y. M., Crites, A., & Whitmore, K. F. (1991). Teaching Skills in Whole Language Classrooms. In K. S. Goodman, L. B. Bird & Y. M. Goodman (Eds.), *The Whole Language Catalogue (p. 308).* Santa Rosa, CA: American School Publishers.

James, Michael. (1986, May). Self-selected spelling. Academic Therapy, 21 (5), 557-563.

Koenig, A. J., & Rex, E. J. (1996), April). *Assuring quality literacy programs for students with visual impairments.* Paper presented at the 74th convention of the Council for Exceptional Children, Orlando, FL.

Herzberg, Tina S., Stough, Laura M., and Clark, Carolyn M. (2004). Teaching and Assessing the Appropriateness of Uncontracted Braille. *Journal of Visual Impairment & Blindness, 98,* 773-779.

Holbrook, Ph.D., M. Cay & Koenig, Ed.D., Alan J. *The Challenge of Providing Appropriate Literacy Instruction for Students with Visual Impairments [Electroversion].* Retrieved May 11, 2006, from http://www.icevi.org/publications/educator/Fall_01article6.htm

Hong, Sunggye, and Erin, Jane N. The Impact of Early Exposure to Uncontracted Braille Reading on Students with Visual Impairments. *Journal of Visual Impairment & Blindness, 98,* 325-340.

Institute for the Blind and Partially Sighted, Refsnaesskolen – National Institute for Blind and Partially Sighted Children and Youth, The Danish National Library for the Blind, the Visual Impairment Knowledge Centre and the Danish Associatiion of the Blind in cooperation. Proceedings from the international symposium Braille In The Age of Digitisation held in Denmark, April 16-19, 2002.

Kleitman, R. Haskell, G., & Dowling, T. (1985). Integrating computer technology to support diverse needs in regular classes. In Harry J. Murphy & J. D. Dunnegann (Eds). *Proceedings of the Conference:*

Computer Technology and Persons With Disabilities (pp. 103-142). California State University at Northridge, Oct. 17-19. Office of Disabled Student Services.

Koenig, Alan J. and Holbrook, M. Cay. (2000). Ensuring High-Quality Instruction for Students in Braille Literacy Programs. *Journal of Visual Impairment & Blindness,94,* 677-694.

MacCuspie, PhD., P. Ann (2002). *Access to Literacy Instruction for Students Who Are Blind or Visually Impaired [Electronic version]*. Retrieved April 11, 2006, from http://www.cnib.ca/eng/publications/access to literacy.htm

Mangold, S. (2000, October). Trends in the use of braille contractions in the United States: Implications for UBC decisions. *Braille monitor, 43,* 12-16.

Mangold, S. (1977). The Mangold developmental program for tactile perception and braille letter recognition. Castro Valley, CA: Exceptional Teaching Aids.

Mather, Nancy. (1992). Whole language reading instruction for students with learning disabilities: Caught in the crossfire. Learning Disabilities Research & Practice , 7(2), 79-95.

Miller, C. & Rash A. (2001, Summer). Reading for everyone: Expanding literacy options. *See/Hear, 6,* 22-26.

Meyers, L. (1987, February/March). Bypassing the prerequisites: The computer as a language scaffold. Closing the Gap, 5 (1).

Newman, J. M., & Church, S., (1990). Myths of whole language. *Reading Teacher*. 44(1), 20-26.

Nielson, L. (1988). *Spatial relations in congenitally blind infants*. Kalundborg, Denmark: Refsnoesskolen.

Schroeder, F. K. (1997). Who should read Braille? In A. J. Koenig & M. C. Holbrook (Eds.), *Proceedings of the Second Biennial Conference of Getting in Touch with Literac*(pp. 13-18). Alexandria, VA: Association for the Education and Rehabilitation of the Blind and Visually Impaired.

Troughton, M. (1992) *One is fun: Guidelines for better braille literacy*. Brantford, Ontario: Dialatype.

Wittenstein, S. H., & Pardee, M. L. (1996).l Teacher's voices: Comments on braille and literacy from the field *Journal of Visual Impairment & Blindness, 90,* 201-209

Addendum

THE KEYBOARDING CURRICULUM TO DEVELOP LITERACY SKILLS FOR STUDENTS WHO ARE BLIND AND HAVE ADDITIONAL DISABILITIES

Keyboarding instruction begins by placing the student's fingertips on the home keys. State the importance of the home keys as an orientation device for both hands (a/k/a the resting position); and emphasize the job of each finger/digit to its corresponding key. Discuss that each finger has a responsibility; some have more than others. Provide verbal prompts with each letter/symbol together with physical assistance as needed. Physical prompts may be given at finger(s), palms, wrists, elbows, etc., and gradually fade to independence.

1. Orient the student to the Home keys.

The student will position left fingertips on (A S D F). The student will position right fingertips on (J K L ;).

2. The student will type (A S D F J K L;). Repeat series until the margin indicator sounds. The student will learn that this means that more space is needed to continue and must use the "return" key to continue.

3. The student will become familiar with and use the "return" key 2 times to double space. Double spacing facilitates the functional reading skills for both braille and large- print readers.

The student will type a full page of this lesson, double spaced.

(Move to the next lesson when the student has mastered this lesson).

Discuss and demonstrate the additional responsibility that digit F has to G (FGF); and, J to H (JHJ). The F finger moves "right" to the G and back; the J finger moves "left" to the H and back.

4. The student will type (A S D F G H J K L;). Repeat series until the margin indicator sounds.

5. The student will become familiar with and use the "space" bar.

6. The student will type the Home keys (A S D F G H J K L;) and hit Space Bar.

Repeat series until the margin indicator sounds. Hit "return" key 2 times to double space. The student will type a full page of this lesson, double-spaced.

7. The student will type three- letter words to home key letters. Instructor will use each word in a sentence prior to dictation. For example (had) "I had cereal for breakfast."

The student will type one line of each word.

The student will hit "return" key 2 times to double-space.

The student will type one line of each word, double- spaced.

*1:1 instruction is important for the instructor to visually anticipate finger placement errors before they occur, and redirect.

When mastered, introduce the top letter row.

8. The student will type (Q W E R T).

9. The student will type (Y U I O P).

10. The student will type (Q W E R T Y U I O P) and hit "space" bar.

Instructor will reinforce that the letter F is also responsible to (R, T and G); and the letter J is responsible to letters (U, Y and H).

Hit "return" key 2 times to double space.

The student will type a full page of this lesson.

Again, reinforce the orientation of fingers and hands to the Home keys and the responsibility of the fingers beginning with (A). Say (A) is also responsible for the letter (Q).

11. The student will type (A Q A,).

At this point introduce the COMMA so that the student will end the series with a COMMA.

12. The student will become familiar with and use the comma.

The student will type (A Q A,) and hit "space" bar, repeat series until the margin indicator sounds, hit the "return" key 2 times, and type another line. The student will type a full page of this lesson.

The pace of instruction and rate of learning will be student specific. (For example, a student may type two lines of only (AQA,) for the first lesson; and then the next lesson proceed to the next series, (SWS,).

13. The student will type (S W S,) and hit "space bar, repeat series until the margin indicator sounds, hit the "return" key 2 TIMES, and type another line.

Again, the student will type a full page of this lesson. As each new letter is introduced, create a functional word vocabulary. Practice new words and previously learned words with each lesson. The student will type one line of each word.

14 thru **23**:

Continue instruction as above until the top row is mastered in the following series: (DED), (FRF), (FTF), (FGF), (JUJ), (JYJ), (JHJ), (KIK), (LOL), (; P;).

Remember that each lesson builds upon the other, review the importance of the correct finger placement on the home keys, and incorporate the previously learned lessons into the new lesson.

24 *The student will type three- six letter words to top row keys.*

Spelling and phonics skills are developed with the use of word endings to formulate new words as new letter keys are introduced.

At some point you may choose to type one of each word, rather than one line of each word.

When mastered, introduce the bottom alphabet row.

25. The student will type (Z X C V B)

26. The student will type (N M , . /)

Instructor will discuss that the letter F and J are by far the busiest of the fingers and have more responsibilities than the others. In addition to the relationship that F has to (R, T and G); AND J to (U, Y and H) ; F is also responsible to (V and B); and the letter J is also responsible to (N and M).

27 **thru** 36:

Continue instruction as above until the bottom row is mastered in the following series: (AZA), (SXS), (DCD), (FVF), (FBF), (JNJ), (JMJ), (K,K), (L.L).

37*. The student will type three-five letter words to bottom key letters.*

The student will type five to ten letter words to include all alphabet letters. Functional vocabulary is enhanced as the student types the days of the week, months of the year, numbers, money words, etc. Learning becomes fun. The student can develop turn-taking skills as the teacher and student engage in a reciprocal "name" game, such as, "Let's take turns and name musical instruments." The instructor then dictates the word, letter by letter, as the student types.

38. *The student will type simple sentences that are functional and related to his daily routine/experiences.*

39. *The student will be introduced to and use the capital key and use a capital letter to begin each sentence.*

40. *The student will use the period (.) to end each sentence.*

41. *The student will use the "return" key 2 times to double space after each sentence.*

42. *The student will type ten functional sentences each lesson.*

43. *The student will be introduced to paragraph writing.*

44. *The student will be introduced to writing functional stories.*