

Test results: Learning one handed input on the EkaPadd

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ABSTRACT

A 30 participant test of the EkaPadd, a 12 key chording keypad, its chording arrangements, its ergonomics, and its learning materials. Many test participants reached 15 wpm proficiency in less than 3 hours.

KEYWORDS: chording, keypad, text input, training

BACKGROUND TO THE TEST

For 3 years, we have worked on a new chording keypad.

From 51 Keys to 12 Keys

One of our goals was to reduce the size of a text input device (the QWERTY keyboard) to a phone pad size.

From 2 Hands to 1

And the other goal was to make it a one handed device.

Ergonomics

Since the EkaPadd is held with the keys away from the user and not visible, we knew that we needed some physical features to help the user know where "home" is. We had evaluated a number of different housings, bumps, curves and settled on a design which seemed pretty good to us: flat keys surrounded by a raised edge. We previously tested 50 people, from 7 yrs to 80 yrs, to establish a key pad size.

Chording

The work to determine the specific chords for the characters had occupied about a year; we felt we were on the right track but needed to confirm our design.

Learning System

Jerry Wilski, our learning guru, kept proclaiming that he could design training which made it easy to learn the alphabet. We had a goal of 2 hours to become proficient enough with the EkaPadd to keep at it. We didn't know if the material we produced would get the user to our goal.

Previous independent research shows that qwerty learners have reached 14 wpm, but only after 11 hours of training (Gopher & Raij, 1983), and users of the experimental Chording Glove reached 17 wpm, but also, only after 11 hours of training. (Rosenberg, 1998).

PURPOSE OF THE TEST

As part of our product development, we needed to obtain user data other than from our own in-house people.

1. Test EkaPadd Chords

The chording system consists of one, two, and some three fingered chords that produce all the characters for the operating system it addresses. Low frequency symbols, such as diacritical accents, require a prefix chord. We needed to see if people could execute all of the chords and if any were particularly troublesome.

2. Test Learning Materials

The most critical test was for the Learning System. Our design is self paced, self motivated and multi tracked so the user can choose the learning method which most closely matches his/her own learning style.

3. Test EkaPadd Ergonomics

The EkaPadd is four key columns by three key rows. Simple as it sounds, this prototype is the result of 6 increasingly improved model iterations. We needed feedback on such details as size of keys, separation of column /row keys, key effort, key snap, key texture.

DESIGN

Participants

15 testers; aged varied group of working professionals
16 college students in a computer/user interface class

Equipment

The test equipment was designed to be as close to a real, complete consumer product as was possible within our budget. Each participant received a box containing the following equipment.

EkaPadd

The EkaPadd is a 12 key data entry device: four fingers high with three positions per finger. Key layout is symmetrical, so either hand may be used. EkaPadd produces 210 characters in the Palm OS.

PDA

A Sony Corporation Clié, model PEG-SJ20

Holding Devices

Our Open & Shut Case mated EkaPadd to PDA, and we supplied additional cabling arrangements.

Learning Materials

Chording Book: a self standing 3-ring book with 74 pages containing the primary lesson sequence and 2 other sequences, plus *Cracking the Code* which allows the user to understand the Crib Card notation. *Exercise Book*: 60 pages of practice sentences. *Crib Card*: All the chords and characters in a pocket sized format.

Data Collection

Questionnaire: 15 pages; during learning, the user is asked to respond at various phases of the test.

Speed test: two 100 word chording tests.

Interview: an unstructured 45 minute interview when the participant finished, 5 to 21 days after starting.

QUANTATIVE DATA

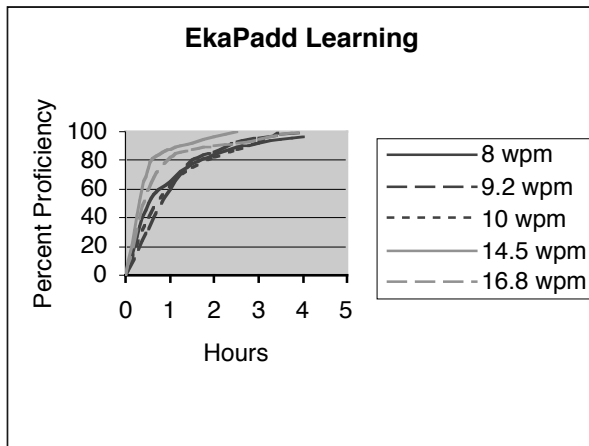


Figure 1. Time spent vs Proficiency

The Graph Shows a Representative Sampling of Learners' Progress Using the Chording Book:

- Least time spent: 2.5 hours and the most 4.5.
- Fastest keying: 16.8 wpm and the slowest 8.0 wpm.
- Time spent was a factor of which Learning Path was chosen; i.e., shorter lessons meant less time spent.
- Speed of keying was less dependent on Learning Path chosen.

At a Proficiency Level of 92% the Learner Can Chord All Letters and Numbers, and Common Punctuation.

- 80% of Learners reached 92% between 1.5 and 2.9 hours.
- 100% of Learners reached 92% between 1.5 and 3.4 hours.

FINDINGS

One Handed: Nearly transparent

Chording: Chords for characters were universally accepted.

Learning materials: Learning materials produced desired results and were universally accepted.

Ergonomics: Physical mastery trailed cognitive mastery.

Most Tester frustrations were reduced if the tester was originally, or became, familiar with PDA operations. We should have had an initial training session on the operation of the PDA, both for working professionals and students. Testing discovered error handling issues, which have now been resolved, and the need to include two reflective chords for "q" and "u". An abbreviated learning path was added.

DISCUSSION

We received valuable and immediately useful feedback from the participants. Over all, the results were significant in all three areas of concern.

We learned that the participants found the chording design perfectly acceptable. No one challenged or questioned the character assignments or their chords. And using only one hand seemed to be "just in the nature of the thing".

Except for minor editorial comments, the learning materials were found to do the job. The only comment of significance was that some users wanted a way to learn the alphabet faster, and so we have added a path to the previous 3 which includes only one practice sentence for each letter. This addition has not been tested.

The finding we must focus on concerns the ergonomics. We are aware of much work done in this area, but in the cases we have found the research has focused on keys, menus, or such where the *eyes* participate in the action. With our keyboard its use is similar to a musical instrument such as a cello, trumpet, or recorder. We have received excellent ideas from the users as to how we can improve the "feel" of the EkaPadd and will proceed on this research.

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