A TEACHER'S EXPERIENCE WITH HER NEW PHONE

a user needs analysis on a teacher's new phone

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ABSTRACT

This report describes teacher Karen's experiences with her new phone, the Samsung Intensity® III that she purchased in late September 2013. The user needs analysis describes several seemingly basic tasks that Karen struggles with in her daily life and work environment. After determining Karen's preconceptions of her needs and her perceived competency in using the device, the report reflects on the process of completing this user needs analysis and prescribes several pieces of design advice.

USER NEEDS ANALYSIS

1. USER CHARACTERIZATION

Karen is a fifty-four year old elementary school teacher who is currently in her twenty-first year as a teacher of young children. She has spent the past ten years teaching first grade at Franklin Elementary School in Wexford, PA. While she uses her mobile device on a daily basis today, Karen obviously did not grow up in an environment in which mobile technology existed. However, whether she knew it or not, Karen began developing the skills needed to utilize the device at a relatively early age.

Throughout upper elementary school, Karen took it upon herself to become acquainted with the standard QWERTY keyboard layout. Intrigued by her father's occupation as a contract manager, she was guided by a book that accompanied her mother's mechanical typewriter. Through these informal, self-guided lessons, Karen learned the basics of what would become the primary input device to technology of the future.

As a senior in high school, Karen pursued her interest in typing by fulfilling one of her electives with a keyboard typing class. It was in this class that she perfected this seemingly vital skill. At Buffalo State College, Karen used her mother's old typewriter to write papers, and in 1991 she graduated from Buffalo State with a BS in Elementary Education. Having met PhD student, Andy, in Houston, Texas, the two married and relocated to Cincinnati, OH where Karen

pursued her graduate work. In earning her MED in Curriculum and Instruction from the University of Cincinnati, Karen used her husband's modern IBM Correcting Selectric II typewriter, one of the first of its kind to support manual correcting of one's mistakes, to write papers and maintain her familiarity with the QWERTY keyboard layout.

As Karen began teaching, her usage of typewriters diminished in favor of more traditional medians that would enable her to express creativity in the elementary classroom. It was not until 1998 that Karen sought out technology again with the purchase of her first cell phone. Unlike the intrinsic motivations that initiated her initial interest in the typewriter, Karen purchased a cell phone solely for her children's safety. Her twins were just beginning first grade, and Karen felt obligated to be connected to the school via a cell phone if anything happened to go wrong. Although she does not recall the exact model of the phone, Karen described the device as "bulky and black with limited functionality." Indeed, Karen rarely used the phone, reserving it for pressing emergencies.

Karen recalls that she owned this first phone for about six years before upgrading to a smaller model. Although this new phone was certainly more manageable, it only supported a standard telephone keypad with three or four characters associated with each digit. Thus, she did not use the device for anything more than infrequent calls. In 2010, as her children were heading off to college, Karen purchased the LG Env2, the first mobile device that she frequently used. Similar to the motivations of her first cell phone purchase twelve years prior, Karen wanted to engage with her children in college via text messaging. The Env2 provided Karen with a familiar QWERTY keyboard layout, a requirement that facilitated the transition to her use of mobile technology. Karen enjoyed using this phone for four years until it began to function incorrectly. In September 2013, she reluctantly purchased the Samsung Intensity® III as a replacement.

As her eyesight has deteriorated with age, Karen has utilized reading glasses for the past four years; however, she has only become dependent on them within the past year. Today, she finds it difficult to read any small text (including the text on her mobile phone's display) without the aid of magnification. She finds it especially difficult to read text in dark environments.

2. TASK ANALYSIS

The Samsung Intensity® III is considered a "basic" phone in today's cell phone market; however, compared to the previous devices that Karen has owned, I believe that this phone is by far the most complex. In addition to the familiar features including a slide-out QWERTY keyboard, world clock and calendar, the device includes an impressive two-megapixel camera with a variety of filters and manipulation settings, the ability to record video, the ability to create and manage music playlists, text to speech conversion and voice commands.

Given that Karen recently purchased this phone, she has obviously not explored all of these features. Therefore, this task analysis will focus on the relatively basic tasks that Karen frequently accomplishes – most of which are surprisingly difficult for her. The tasks described below represent a subset of the tasks included in Table 1 at the end of this report.

2.1 ANSWERING AN INCOMING CALL

Arguably one of the most important tasks of a cell phone involves answering an incoming call. In Karen's case, she emphasizes this importance: the ringtone is extremely distracting in her work environment; thus, immediate response is imperative. In most cases, the goal of this task is to initiate a conversation with the caller; however, as I have suggested, it is often the case that Karen wishes to stop the distracting ringtone. Either way, this task is executed by either pressing the '[' send button on the front of the device or sliding the device open. The latter action will accept the incoming call while also turning on speakerphone, a mode that is usually not desired.

If Karen answers her phone correctly, the ringing terminates and a connected animation is displayed on the screen.

2.2 CHECKING VOICEMAIL

In the event that Karen misses an incoming call, people have the ability to leave her an audio recording or voicemail. When this happens, a visual icon is enabled on the display screen, notifying Karen that there is an unread voicemail in her inbox. In order to listen to this recording, Karen must press and hold '1' or call the number '*86'. In either case, she will be prompted to enter her password. This four digit password is entered via the keypad, prefixed by '#'. If the valid password is entered correctly, an auditory menu prompts Karen to press '1' to listen to the unread voicemail. At any of these sub-tasks, Karen's actions are evaluated by auditory feedback. For example, if she enters an incorrect password, the auditory interface will notify her of this error and ask her to try again. Assuming that she executes the appropriate actions, Karen will ultimately be able to listen to the voicemail. However, Karen explains that she is almost never able to check her voicemail due to the burden of remembering the steps outlined above.

2.3 SENDING TEXT MESSAGE

One of Karen's most important tasks enabled by the phone's QWERTY keyboard, sending text messages enables her to communicate with family, friends and co-workers in a quick and non-intrusive manner. This task can be executed by selecting the 'New Message' option in the message menu. Alternatively, Karen can simply begin typing in a given recipient's conversation view. Once the message has been completed, the 'OK' button can be pressed which will send the message. A 'Message Sent' dialogue displayed on the screen confirms this task.

2.4 UNLOCKING PHONE

Unlocking the phone may seem like a rather trivial sub-task; however, I am including it here given Karen's apparent frustration. Aside from answering an incoming call, almost all tasks require Karen to unlock her phone after any relatively short period of inactivity. The phone can be unlocked by pressing two buttons: the '−' soft button on the front right side and then the 'OK' button on the front center of the device. After executing this button combination, Karen is able to access the task at hand (for example, she can read a text message or simply view the home screen).

3. SITUATIONAL ANALYSIS

Throughout the analysis described above and continued in Table 1, various situations could arise that would impact Karen's performance. Karen specifically experienced the highlighted situations described below.

3.1 BRIGHT ENVIRONMENTS

In the event that Karen is using her mobile phone in a bright environment (such as the sunny outdoors), almost all tasks become extremely difficult to complete. This is directly related to the glare that is produced on the glossy thin-film-transistor liquid-crystal display (TFT LCD) display. Karen specifically cited two tasks that are particularly challenging in such environments: sending a text message and adding a contact. Both tasks depend heavily on the use of the display screen, which is obscured by the glare. Karen has experienced this problem while outside under the sun as well as inside under the fluorescent lighting of her work environment.

While there are certainly some screen protectors on the market that advertise anti-glare, this additional expense is usually not a desirable option. Utilizing an anti-glare screen with a type

of matte finish instead of the glossy TFT LCD could solve this problem.[1] Alternatively the device could include a built-in sensor that automatically adjusts the brightness of the screen based on the environment it finds itself in. Both of these possible solutions are not implemented in the Samsung Intensity® III.

DARK ENVIRONMENTS

As a corollary to bright environments, dark environments also pose some difficulties for Karen. For example, after checking her phone while in the car late at night, it took a few seconds for her eyes to adjust to the bright screen. Luckily she was not the one driving; however, a built-in sensor that automatically lowers the brightness of the screen in dark environments could have eliminated this potential risk.

Additionally, Karen described her frustration while taking photos with her mobile phone in the dark. While the device has a relatively decent camera, it is certainly not optimized for the dark. Specifically, the phone does not have a "flash" which is typically comprised of an LED light in mobile devices today. The phone does include a "Night Shot" mode; however, this merely adjusts the exposure of the dark photograph.

DISTRACTING ENVIRONMENTS

Given the fact that Karen works in a first grade classroom, there is never a dull moment. Karen is always busy trying to appease twenty-four young boys and girls, and she cannot afford to waste time trying to manipulate her phone. In one particular example, Karen describes her inability to silence an incoming call that was drastically interrupting her lesson. She was frantically pressing buttons, and one of her students even offered to help! She was finally able to press the '[' send button which accepted the incoming call and silenced the ringtone; however, to

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[1] At the MIT Mobile Technology Summit this past summer, Corning released some insight into a new anti-reflection and anti-microbial technology. This technology, comprised of the glass that is used for optical fibers, has a transparency that is comparable to "air on a clear day" (P. Daniel).

this day, she still does not know how to silence her phone. (After reading the manual, it turns out that the '−' left soft button silences the ringer on incoming calls.)

The fact that Karen could not silence her cell phone certainly does not imply that she is incapable of using the device. For if she was solely concentrating on her phone in a contained environment, I am sure she would have noticed that the display screen indicated which button to press to silence the ringer. However, Karen was in the middle of a lesson and was trying to maintain control of twenty-four first graders; thus, she was not concentrating on the state of the device at all; she was just desperately trying to terminate the interruption.

4. ACCEPTANCE CRITERIA

Throughout my interview with Karen, she would frequently begin a response with a sense of obligation as to why she was using a piece of technology. Aside from the typewriter that she grew up with, Karen never seemed to have made an independent choice regarding the adoption of subsequent devices. In other words, she always had to give an explanation as to *why* she adopted a piece of technology.

For example, she purchased her first cell phone solely out of concern for her children who where now attending elementary school. She made it very clear that she did not use the device for anything else other than accepting incoming calls from the school. Additionally, I suggest that she did not want to *try* to learn how to use other features of new device. Karen's perception of her first mobile phone's purpose was constrained; once the device fulfilled her basic needs, she was unwilling to adopt any further applications.

Similarly, when she realized that her children preferred to communicate via text messages in many situations, Karen agreed to purchase a new cell phone that incorporated a full QWERTY keyboard layout. I suggest that this decision has two meanings. On one hand, it demonstrates that Karen was unwilling to learn how to text via the standard keypad layout.

(Having texted via this median throughout the latter part of high school, I can attest to its initial inefficiency; however, it is certainly something that can be learned.) On the other hand, it illustrates that Karen carried the same constrained notion about the new device she was adopting. That is, the new cell phone was to be used for the specific purpose of communicating with her children; any other functionality was irrelevant and not worth the learning curve.

The suggestions I derived above might be slightly exaggerated, but they do capture the vibe I was getting from Karen. In a general sense, she seemed insecure about her proficiency with the technological devices she described, and there is no doubt that she shares the same notions about the Samsung Intensity® III of which she recently purchased. A situation Karen briefly described confirms this statement.

In one of her attempts to silence the ringtone of an incoming call, Karen described how she frantically executed a button combination, repeatedly pressing the volume-down button on the side of the device before immediately pressing the 'OK' button. This successive confirmation (pressing the 'OK' button in between the volume adjustment) was unnecessary; however, I speculate that it must have been the first button combination that worked. Relieved that she managed to silence the ringer, Karen did not attempt to search for a more efficient alternative. Moreover, she did not believe that she was *capable* of finding a more efficient alternative. Certainly she would have been able to determine the correct way of turning down the volume without pressing the 'OK' button, but her preconceived notion concerning her lack of ability to use the device prohibited her from doing so.

Thus, while Karen has difficulties with several aspects of her mobile phone, one should resist from jumping to any conclusions about the actual device. That is, the apparent lack of usability may be largely attributed to her preconception that she is incompetent before she even attempts to use the device.

CRITIQUE

1.1 ANALYSIS: MOST DIFFICULT COMPONENT

The most difficult component of the user needs analysis was by far the last component: acceptance criteria. In particular, it was difficult to determine Karen's of her needs and her mobile phone's fulfillment of these needs without directly asking her about them. I decided to omit these explicit questions for several reasons. Although I knew that Karen was not entirely comfortable with technology before I began the interview, I did not want to make this opinion apparent during the interview. Instead, I tried to focus on asking questions that did not embed any subjective preconceptions. For example, rather than ask why Karen did not use more complex features of her mobile device, I decided to strictly focus on the (seemingly basic) features she did use. In this respect, I attempted to hide my existing expectations, letting Karen control the direction and development of her interview.

While some may believe that directly inquiring about acceptance criteria might elicit more accurate conclusions, I suggest that doing so would actually have a negative impact on the accuracy of the report. Many users will be unable to describe their opinions and preconceptions given that they are implied subconsciously. Other naïve users who are uncomfortable with a particular technology are generally unwilling to admit it. Thus, some users may fabricate their preconceptions or even come up with invalid excuses as to why they did what they did. At the very least, users are usually embarrassed about their poor performance, a realization that will certainly impact their responses of subsequent questions.

Thus, the conclusions I came up with in regards to acceptance criteria are primarily inferred from indirect aspects of Karen's interview. In doing so, I attempted to maintain an objective interview environment while ensuring that Karen's responses were not constrained by leading questions that may not have any concrete answers.

1.2 ANALYSIS: EASIEST COMPONENT

For me, the easiest component to the user needs analysis was the first component: user characterization. Having known Karen for most of my life, I already had a pretty good idea about her relationship with technology during my lifetime. However, I was thrilled to learn about her initial experiences with typewriters, especially as it related to the purchase of her first mobile phone that incorporated a QWERTY keyboard layout.

Regarding the interview itself, it was particularly easy to formulate questions about the user characterization component. In fact, I did not have to interject much at all as Karen recited her past experiences. This portion of the interview was not only fulfilling for me, but it was also a welcomed reflection on the life of Karen as she described her experiences with mobile phones.

Unlike other components of this interview, user characterization is a common aspect of most interviews; thus, Karen was probably expecting to be asked such questions. Other components such as analyzing a task that one performs regularly are generally not thought about and require additional concentration and guidance.

1.3 ANALYSIS: USEFULNESS OF USER NEEDS ANALYSIS

There is obviously not a clear-cut answer concerning the usefulness of this user needs analysis. However, in general, I *do* think that it would be useful. Specifically, this analysis demonstrates the importance of considering a user who has essentially used the device for the first time. At the time of this interview, Karen did not own her Samsung Intensity® III for more than a month. Thus, many of the tasks that she had difficulties with were most likely related to her inexperience with the device. Although a more experienced user would not be troubled by these tasks, this alternative point of view does *not* justify the universal effectiveness of the device's usability. Given that the designer is in some ways the *most* experienced user, the sole analysis of another experienced user is nothing more than a confirmation of what the designer

already knows. Therefore, it is in the consideration of the inexperienced user in which the designer realizes the problematic choices he or she took for granted.

While a lot can be said about the effectiveness of an inexperienced user needs analysis, one must also be cautious about the conclusions reached. As indicated throughout this report, an inexperienced user such as Karen is more likely to carry preconceptions that negatively impact his or her performance. Thus, the apparent usability concerns indicated by poor performance could mainly be caused by the user's previously held opinions about the device, their needs or technology. If this is the case, the conclusions of the user needs analysis might not always indicate that a change in the design should be made.

Although, in general, the special characteristics introduced by unique users and their environments is invaluable to effective design considerations. As Donald Norman explains, "There is no such thing as the average person" (Norman 161). A variety of thorough user needs analyses will ensure that the designer accommodates for various needs.

2.1 DESIGN ADVICE: ACCOUNT FOR THE WORST

When a product is released, I would imagine that most designers are completely satisfied with their product from their point of view. Hopefully the designer has also considered a variety of other users, but how many of them have considered the worst scenarios? Sure, these scenarios are generally edge cases that cannot all be accounted for; however, consideration of these possible errors is an essential component to the design process. Shneiderman and Plaisant list error prevention as one of their fifth and most important golden rules of interface design: "As much as possible, design the system such that users cannot make serious errors" (Shneiderman and Plaisant 70).

In one task that I was unable to discuss in this report thus far, Karen described the difficulty she had in charging her mobile phone. Specifically, she was trying to plug in the USB

Power Adapter into the memory card slot on the side of the device. At first, I was shocked at her

mistake. However, I almost immediately questioned the constraints, looking for an explanation

as to how Karen attempted to use the incorrect input.

Accounting for error may seem pointless to an experienced designer; however, one

cannot assume the circumstances in which their device is going to be used. A task that appears to

have a completely obvious and foolproof execution may be carried out incorrectly. Depending on

the severity of the error, the effects could be disastrous.

2.2 DESIGN ADVICE: BEWARE OF CREEPING FEATURISM

In the competitive cell phone market, companies are under immense pressure to sell their

products. The mobile technological advances even over the past several years are seriously

impressive, and companies feel obligated to stay on top of the game. At the beginning of this

report, I mentioned some of the impressive features advertised by the Samsung Intensity® III: a

two-megapixel camera with a variety of filters, the ability to record video, the ability to create

and manage music playlists, text to speech conversion and voice commands, video messaging

and Bluetooth 3.0 support – the list goes on and on.[2] I also mentioned that this particular model

is considered a "basic" phone.

Unfortunately, for what she needs to use it for, Karen's phone certainly does not seem

basic. Of these impressive features, Karen might take a photo once in a while. Other than that,

these features do nothing but complicate Karen's experience with the device. Moreover, it is not

the case that Karen has any desire to learn how to use these new features for reasons listed

above. If this is the basic phone of today, what new features will be present in the basic phones

of the future? The fact that this question was even posed exemplifies what Norman defines as

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[2] If you are interested in viewing a complete list of features, visit the Samsung Intensity® III product website on
samsung.com.

creeping featurism: "the tendency to add to the number of features that a device can do . . . beyond all reason" (Norman 173).

2.3 DESIGN ADVICE: MAKE THINGS REALLY OBVIOUS

This piece of advice is clearly related to one of the key concepts introduced in Norman's book and emphasized in Dr. Nancy Weaver's lectures: make things visible. Aside from the literal visibility concerns described above that are introduced by bright environments, this piece of advice specifically targets usability in the context of distracting environments. Recall that when her phone rang in the middle of a first grade lesson, Karen struggled to silence her phone. To some users in a contained environment, pressing the '[' send button or the '−' left soft button to accept the incoming call or silence the ringer respectively might seem obvious. However, as she was obligated to maintain control of her twenty-four first graders, Karen was unable to perform the task efficiently.

The use of the word 'obvious' in this prescription is relative. What might seem like an obvious choice in the concentrated environment of the design studio might not be obvious at all when it comes to an inexperienced user caught up in the distraction of his or her work environment. By making things obvious, I suggest that a frequently used task such as answering a mobile phone should require almost no thought no matter what type of user is using the device. Only then will users truly "know what is possible and how actions should be done" (Norman 198).

CONCLUSION

This user needs analysis described Karen's experiences with her new phone, the Samsung Intensity® III that she purchased in late September 2013. In describing the seemingly basic tasks that Karen struggled with, I attempted to justify the importance of considering a variety of user's

needs – including those who are using the device for the first time. After determining Karen's preconceptions of her needs and her perceived competency in using the device, I emphasized that the conclusions reached must be acted upon with caution. That is, it might be the case that the usability problems suggested by Karen's errors are isolated and solely related to the preconceptions she held prior to using the device. Still, the unique experiences described by Karen's distracting work environment are crucial in accounting for various users' needs. The report concludes with a brief reflection on the process of completing this user needs analysis before prescribing several pieces of design advice: Account for the Worst, Beware of Creeping Featurism and Make Things Really Obvious.

REFERENCES

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3. "Samsung Intensity® III," *Samsung*, <http://www.samsung.com/us/mobile/cell-phones/SCH-U485RKAVZW>.

4. Ben Shneiderman and Catherine Plaisant, *Designing the User Interface: Strategies for Effective Human-Computer Interaction*, 5th ed. (Boston: Addison-Wesley, 2010).

TABLE 1

TASK NAME	ACTION CYCLE			SPECIAL CHARACTERISTICS		ERRORS	
	Goal	Execution	Evaluation	User	Environment	Possible Error	Prevention/Recovery
Answer an incoming call	Initiate conversation with person on the other line *or* simply terminate ringing	Press the '[' button or open the phone (turns on speakerphone)	Stops ringing and shows connected animation on display	Poor vision, big fingers, preoccupied or distracted (unable to remember how to answer)	Darkness ('[' button is not illuminated), inclement weather, fast-paced work environment	Press an incorrect button	Phone continues to ring
Checking voicemail	Listen to a recorded message from a missed call (notified on display screen)	Press and hold '1' *or* '*86' + '[', then '#' before entering the password; press '1'	Call connects, user is prompted by auditory voicemail menu, then listens to message	Impatient, forgetful, careless, stressed	Loud surroundings	Press an incorrect button Entering password at incorrect time	Expected action is not initiated User is not prompted by voicemail menu
Sending text message	Communicate with a person via relatively brief strings of text	Click 'New Message' in message menu or begin typing in conversation view; press 'OK' to send	'Message sent' is displayed on screen	Big fingers, poor vision, easily distracted, impatient	Bright/sunny environment (unable to see screen)	Send text to wrong person Misspell words Incorrect conventions (capitalization)	Recipient is listed at top of screen (none) Results of key presses displayed on screen

TASK	Goal	Execution	Evaluation	User	Environment	Possible Error	Prevention/Recovery
Receiving text	Read relatively brief strings of a text from a person	Press 'View Now' from prompted display screen	Screen displays contents of text message	Poor vision, big fingers	Distracting environment, inclement weather	Phone is locked (requires two additional key presses)	Display alerts user phone is locked and user is unable to view message
Unlocking phone	Execute a particular function of the phone after time of inactivity	Press '–' button on right side, then press 'OK'	User is able to execute function (such as viewing a menu or reading a text)	Impatient, big fingers, directionally challenged	Inclement weather, fast-paced	Press incorrect button Accidentally unlock phone (in pocket)	Dialog pops up on screen with instructions on which button to press Two buttons are required to unlock phone
Take photo	Capture visual data from built in camera in the form of an image	Press 'Take Picture' in *My Pictures* Options menu, then press 'OK'	Real-time display; preview of photo on display screen	Forgetful (hidden in nested menus), poor vision	Darkness (no flash), inclement weather	Pressing incorrect function	Photo is not taken
Adding a contact	Store a person's number for future reference	Press 'New Contact' in the Contact Options menu	'Contact saved' animation displayed on screen	Poor vision, big fingers, easily distracted (must remember number)	Fast-paced, distracting or bright environment	Enter the incorrect number	(none)
Charging phone	Restore the depleted battery	Plug in wall adapter to bottom of phone	Display screen lights up and battery icon animates at top	Unobservant, clumsy	Darkness	Plugging the adapter into the wrong input	It does not fit (but some users may try and break it)