

Learning by tablet

Introduction

There are many who have done research in what way you can make the learning situation better with introducing a tablet as a tool to use in lectures and seminars. With great result of how it opens up possibilities for lecturer to introduce new and more effective ways of teaching. The reason I have chosen not to focus on this is that in Norway students do not pay tuition fees (only token fees). This will make it harder for any school to give every student a tablet, and demanding that students have their own tablet is not possible with the political climate in Norway. There are on the other hand not many articles that take on the task of introducing the tablet as a private tool for helping students in their life, so this will be my focus. Especially I will focus on how these new devices are in terms of reading and writing, and all that come with these activities.

There have been many attempts to try to make a paperless world. There are many companies, organizations and school environments where they have tried to steer away from paper. The problem as I see it is that they always try to look at paper as one thing and electronic device as one thing. How can we get all this paper over to this desktop computer. The important thing here is the wording "all this paper", we are talking about paper as more than one thing. For as we all know you always have countless of papers lying around your work/study place. We have paper in many different formats: articles, books, post-it notes, notebooks (in all sizes) and receipts. It is not only that we have many kinds of paper but every kind of paper can be used in different ways, even the same kind of paper can be used in the same way. So why is it that we always look at how we can translate this into one kind of electronic device.

With the arrival of new kinds of tablets like the Kindle and the iPad that are more focused on the mass market, and a totally new way of looking at a computer device. The question arises what is a tablet. The old definition seems to be a computer with touch screen, and with computer we are talking about the desktop OS transferred to the tablet. Some would possibly argue that a Kindle is an eReader and not a tablet, since the main task is to read books. I want to enhance the perception of tablet devices to encompass all electronic slates (thin screen) with touch interface with a larger screen. A tablet is a mobile device, but not mobile in the same way as a smart phone. The main difference is between a smart phone and a tablet is that a tablet, is that a smart phone is for one person to look at and the tablet is easy for several people to look at the same time.

The introduction of the tablet has made the question arise again, is a paperless world a possibility and is the new kind of tablets the solution. With every new technology it seems alluring to put the old one behind us. Paper is one thing we have striven to put behind us, but has failed every time. To investigate if this time it is different I want these questions answered:

1. What are the similarities and differences between the use of tablets and pen/paper for reading and writing in a learning environment?
2. Does a tablet differ from paper in ways of mobility in collaboration?
3. How can looking into the ecologies of artifacts, help us with the paper vs electronics problem?

To find out about these questions I have done a personal study of on tablet device (Kindle), done some interview of students and done an observation study of different offices at the university. I will also engage myself in the literature that may give some answers about my research questions. The two articles I have my main focus on is Jung, H., Stolterman, E., Ryan, W., Thompson, T. and Siegel, M.(2008) and Luff, P., and Heath, C. (1998).

Metode

Kindle (e-readers)

First out for testing was the Kindle tablet. To call the Kindle a tablet is questionable, but as I said earlier as long as it is a tablet that gives you electronic information and gives you a screen that is usable for more than one person to glance at, I will call it a tablet. First I went about familiarising myself with the device, by reading a couple of books on it. This I did just to get the feel for it over a longer period of time, and reading books seems to be the main purpose of the Kindle. This also gave me the opportunity to test out how good it is to read on over longer stretches of time. Later on I started testing the other possibilities of the Kindle. The possibility to read word documents, pdf and other documents one finds oneself using in a learning environment maybe here I should be more specific and talk about a university environment -Kim Åge Ditlefsen 5/3/10 3:01 PM environment.

irex, Que, Entourage

Interviews

I wanted to see how other people looked at how they used pen and paper vs other electronic devices in their daily life as student. So to find out a little more about this I am setting up some interviews where I get the subjects to try reading an article of choice on the Kindle, and afterwards asked them some questions about their habits as students.

Litterature review

The myth of the paperless office

Sellen and Harper ask the question what is the "affordances" of paper. This is an important question in their book. They say that they see a trend that technology changes the way paper is used, instead of replacing its use all together. Technology radical alter the office work, but the result is not always that the need for paper goes away sometimes it actually creates more demand for it. Internet for example makes it easier for people to access information than before, but people still print out the information on paper when they want to read it.

This leads to that technology hasn't replaced paper for a reason, so what are the affordances of paper? explain what they mean with affordance of paper, or affordance - Kim Åge Ditlefsen 5/4/10 2:22 PM

From Sellen and Harper's exploration they found there to be four main reasons why paper supports reading so successfully

1. *Paper helps us flexibly navigate through documents.*
2. *Paper facilitates the cross-referencing of more than one document at a time.*
3. *Paper allows us to annotate documents easily.*
4. *Paper allows the interweaving of reading and writing. p.76 Sellen and Harper(2002)*

From this they went on to make a study where they wanted to look at how people read. Not only in depth, but also in terms of breadth and diversity. They made this a diary study where they got people from different work backgrounds (airline pilot, general surgeon, nurse, architect, real estate agent, lawyers, warden, accounting assistant, marketing manager, executive and social worker). This people was picked because they wanted people with jobs varied in least three major ways:

1. Mobility. (mobile across several location or not)
2. Location (Different activity location, such as traditional offices, home offices and other work sites)
3. Collaboration

The findings from this study forced Sellen and Harper to radical rethink their assumption about what it means to read. They summed it up the findings about how people read in a different work environment in figure 4.1 in their book.

Figure 4.1

A taxonomy of work-related reading.

- **Reading to identify** - Glancing at a document only in order to identify what a document is or what type of document it is.
- **Skimming** - Reading rapidly in order to establish a rough idea of what is written, to decide whether any of its content might be useful, or whether anything needs to be read in more detail later.
- **Reading to remind** - Reading specifically in order to remind oneself of what to do next, e.g., a to-do list, shopping list, Post-it note.
- **Reading to search for answers to questions** - Reading to search for particular information: to answer a question, for reference, or to obtain information necessary to make a decision. This kind of reading is goal-directed ranging from very simple goals to complex decision-making or problem solving tasks.
- **Reading to self-inform** - Reading for the purpose of furthering general knowledge without any specific goal to which the information will be applied.
- **Reading to learn** - Reading with the goal of being able to relate or apply information at a later date. Includes reading to review the basic concepts for discussion, or reading which is much more reflective in nature.
- **Reading for cross-referencing** - Reading across more than one document or more than one page in order to integrate information. This is often done for the purpose of writing, and many will include some editing activities.
- **Reading to edit or critically review text** - Reading in order to monitor what has been written in terms of content, style, grammar, syntax, and/or overall presentation. Includes editing one's own text, seeing how one's own text fits into a collaborative document, or the review of the text of others.
- **Reading to support listening** - Reading to support listening to someone else talk (e.g. following a presentation by looking at a series of slides).
- **Reading to support discussion** - Referring to a document during a discussion in order to establish a mutual frame of reference and focus for discussion. Usually take place in a face-to-face meeting.

Based on the result from the diary study they designed a new laboratory study. This to investigate how different kinds of reading are carried out. Specifically how people's habits are while interacting with paper versus computer screens while reading. They did this by dividing up the subjects, so half read, annotated and wrote with pen and paper and the other half with a desktop computer.

Sellen and Harper(2002) finds from the study of reading on computer versus paper that one is weary limited when reading on computer screen in relation to reading paper. For example, when you read on paper, you do not focus on anything other than reading. You turn the page without thinking, you feel the thickness of the document and find out how far you read. All this means that when you read on paper you are not distracted from the main

visual task. The opposite is true of reading on a computer screen, they state that on a computer screen you have to break away from your main activity, because your manipulation of the document relied heavily on visual, spatial constrained cues. One other main difference was that people reading on paper used two hands in a sort of parallel processing sort of way, while people reading on a computer was limited to a one hand manipulation by using the mouse and every action came in serial order. While reading paper you used two hands all the time, the way your hands work together that meant you could process information more rapidly. On the PC, however, one was limited to one hand, this making everything sequentially instead of parallel. On the computer you were disturbed by mundane tasks, such as changing page, scroll, shift windows between writing and reading, and shifting window between reading and reading, and all these mundane tasks had to be done in serial order.

Some of what Sellen and Harper(2002) concluded with from these two studies is that paper is the first choice when one is doing the different forms of reading. Even if the most high-tech technology is at hand. Reading is often done in conjunction with many other activities. For example more people read and write than only read. Reading is as often involving multiple documents as it is reading just one document. They also go on to say that there are different kind of characteristic clusters of what kind of reading people do, depending on the job they do.

From these studies they conclude with four affordances of paper for reading. This four affordances is:

- tangibility
- spatial flexibility of paper (cross-reference)
- tailorability (the possibility to annotating a document as part of the process of understanding)
- manipulability of paper (read and write next to each other)

They

disse må jeg få burkt på en måte

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the limits that paper places how it can be used are as follows:

- Paper must be used locally and cannot (without supporting technology) be remotely accessed.
- Paper occupies physical space and thus requires space for its use and storage. Vast amounts of paper require vast amounts of storage space.
- Paper requires physical delivery.

- A single paper document can be used by only one person at a time (or, at least, if shared, this significantly changes the way it is used).
- Paper documents cannot be easily revised, reformatted, and incorporated into other documents.
- Paper documents cannot be easily replicated (without the help of photo-copiers, scanners, etc).
- Paper documents, on their own, can be used only for the display of the static, visual markings. They cannot display moving images or play sounds (without technological assistance).

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Paper supports at least five important aspects of knowledge work:

1. It supports authoring work - although knowledge workers use electronic technologies when they are composing documents, paper is the key part of this process alongside the computer. They may draft documents electronically, but they show an overwhelming need to refer to paper as they do so.
2. Knowledge workers review documents on paper, especially their colleagues' work. They read it reflectively on paper, and annotate and comment on it as they do so. They do this despite the fact that they could do this on their computers.
3. When they plan and think about their projects and activities, they use pen and paper as the primary means of organizing the work and writing the plans,
4. Paper their collaborative activities: they sit at conference tables and go through a hard copy of the reports they are working on. They juxtapose sheets of paper and make marks on their documents in the course of their discussions.
5. Paper helps knowledge workers grease the wheels of organizational communications. Whenever an important document needs to be shared, knowledge workers will print out a hard copy and hand-deliver it themselves to their colleagues rather than send it electronically.

denne kan være interessant, men da måske bare den sidste del
p.150 tabel 6.1

The Affordances of Paper and of Digital Technologies for Reading

Affordances of Paper

- Quick, flexible navigation through and around documents
- Reading across more than one document at once
- Marking up document while reading
- Intertwining reading and writing

Affordances of Digital Technologies denne del er det jeg mener, siden den andre

- Storing and accessing large amounts of information
- Displaying multimedia documents
- Fast full-text searching
- Quick links to related materials
- Dynamically modifying or updating content

Mobility in Collaboration

The premissis for this article is that the mobility feature in collaborative work is largely overlooked in CSCW (computer supported cooperative work). Luff, P. and Heath, C. (1998) want to examine the way mobility is important in collaborative work. By examining three different settings of collaboration in work: primary health consultations, construction sites and London Underground. There seems to be a trend in CSCW that introduction of new technology tie people down to more specific place or area, instead of enhancing the individuals flexibility in the environment.

In the setting of primary health consultations they look at the use of paper based medical record that follows the patient around. The paper medical record exist still in spite of new digital technologies. Some of the reasons that it still exist is because of the portability of the record, but also the multipurpose of it. You can note on it in any type of circumstances with a pen, they use it as a point of reference while talking with the patient, either by pointing to it in conversation or by showing the patient the paper medical record. A computer system is more of a furniture, its demand and orientation. One can not manipulate computer as easily as one did paper, it is not possible to switch for looking privately to showing the medical record to the patient. Paper allows the user to manipulate the configuration of the artifact themselves.

The next setting is the construction site, where the allocation sheet the foremen used on the construction site round was the object of interest. This allocation sheet was a record of work undertaken and how much time spent by different work gangs on different projects. People used it both as a record, but also as a resource artifact. Different people used it to get different information from it.

The firm they study introduced a new digital system for this, their solution was a small PDA (laptop), with a mobile phone connected to it to give it connectivity while on the move on the construction site round. The new system was introduced mainly for the purpose of giving everyone access to a updated record of the activities on the construction site. In this regard it was a success, because one of the improvements was that cost data was produced one week before. The problem was that the foreman could do the daily round as

they used to before. A hand over of data that before took only moments, was transformed to extensive activity. They also observed that the mobility of the paper allocation sheet was important, the foreman could have it in hand and discuss point on sheet with work gangers (boss of the work gangs) and take notes on the paper. But when the computer was used, he was sitting behind that and had focus on finding the right places to fill out on the computer screen with the gangers. The focus transformed to filling out the form rather than talking to the crew and rotating out problems as they accrued. The foreman solved this problem by doing all input to the computer in site hut, and using a notepad or the old paper allocation sheet to note down the information while on the rounds. After a while the more permanent solution was to hire a new person, whose only job was to transfer the information from the foreman to the computer system.

The problem with the solution was the people that had developed it hadn't thought enough about how important mobility on the site was, not just mobility in the way of making it possible to take a device on site, but the micro mobility of carrying and making notes at the same site. That introducing a laptop made a difference in collaborating with people on the site. The laptop doesn't have the same flexibilities in configuring it to different forms of use as the paper allocation sheet had.

The last setting in they talk about is the London Underground, what differentiates this compared to the others are that they are working on finding a solution for London Underground problem. The problem lies in that all of the functionality of the London Underground for the employees is in one fixed location, the Ops' room. Everything is in this room, radio to communicate with employees, CCTV, public address system and direct line to line control and the police. So the problem is once personnel leaves this room the only way of communication is through the radio bands with other personnel.

The information they see that they need for mobile employees is:

- CCTV picture
- current state of traffic
- audio communication
 - with various personnel
 - inside and outside
 - with passenger
- gate and alarm operation
- station diagrams

The access to the information is thought to differentiate what different employees jobs. The problem is that CCTV pictures on a small screen is of no point. It is not possible to discuss with other employees what one sees on a CCTV picture if it is on a small picture, at least the cases that are of importance in this setting. A picture of a suspect package (possible bomb) is impossible to see on a small mobile screen in any detail. This of course leads to the problem of mobility, a large enough screen would not be mobile. Their solution to this quandary is to

mix small and large screens. Small mobile screens that the employees can take with them, and large fixed screen that are placed around the station. The large screens were planned to be multipurpose screen, information screens for the public, with special uses when employees used them. This will make it possible for employees to discuss a picture on the fixed screen, give the emergency services access to station diagrams and CCTV pictures in case of emergency and makes the employees able to answer passenger queries. This solution makes it possible to shift from individual and private to collaborative and public very easily by using different artifacts. Most of the information is still in fixed position, but this time it is in many locations spread around the underground system.

Luff, P. and Heath, C. (1998) states that mobile devices are usually regarded in terms of how they can receive and transmit information while the individual is moving about. They say that even if this is important this often makes us forget the potential in mobile technologies to support collaborative activities by moving documents, information, objects between different devices with different capabilities. In their summary p.313 they say:

"In considering the requirements for, and development of, more flexible and mobile technologies to support collaborative work, it may be that we need to explore in more detail how objects are used in interaction and forms of work where the mobility of participants is critical to that work."

They say that there could be other ways of looking at the conventional personal workstations, mobile devices and systems for ubiquitous computing. They want to look at it in a way that it fits local demands of the participants in the setting they are in. This leads us to the next article that talks about the ecology of artifacts (devices) and how people use different artifacts in different ways based on what kind of ecology they have.

Toward a framework for Ecologies of Artifacts

How are digital artifacts interconnected within a personal life.

In this article Jung et al. (2008) wants to look at two things: to explore the relation between users and their digital artifacts, and the relation between the artifacts themselves. They want to help designers and researchers develop a framework within artifact ecology and to help them consider the dynamic relation between the artifacts rather than just one artifact on its own. They designed an exploratory study in two parts to find out more about this. The first part was a personal inventory study, where each subject made a list of all their digital artifacts. The subjects were also told to select one adjective for each artifact on their list. All this was done in a semi-structured interview. In the second part they were given a post-it note for each artifact from their list. They were then told to place each of the post-it notes on a whiteboard, and given markers to sketch relations on the whiteboard.

Based on the results and findings on this study they introduced the notion of *ecological factors*. These factors makes an ecology based on the connection between artifacts, and the commonality through a group of artifacts. There are four ecological factors that they discuss:

- connection through information sharing
 - connection through functional compatibility
 - contextual affordance and commonality
 - ecological values changing behavior
- write under her a short text about each different factors. ecologiact factor -Kim Åge Ditlefsen 5/6/10 9:32 PM

Connectios through information sharing, is explained that the connection between artifacts made by sharing of information. People have several computers and you share information between your home computer, laptop and your work computer. So they are conneted, but also the devices you share the information through. This devices range form external hardrive, music player and smart phones, but there were also web based services that connected digital devices, like email and schedulers) People aslo looked at their artifacts in the way of primary, secondary and complementary. This showed how the artifacts wher thought of in the ecology of artifacts.

Connection through functional compatibility is understod by the way artifacts is compatibal with each other

"[P8] I think I use my home theater system more with my iPod than with my DVD player. I have all my music there (iPod). I don't want to lisen to them through earphones even at home." (Jung et al., 2008, p. 206)

Case

Learning by tablet is to broad a specter, so in this case i want to look at larning in a university enviroment. maybe this fits better in the introduction chapter -Kim Åge Ditlefsen 5/3/10 3:02 PM

Using tablets as devices in a learning situation in universities. (Så finn på en måte å si dette med 200 ord :))

Findings

Kindle as a device for reading and reading in a university setting. After the initial face of trying to read for long stretches of time I found out that the readability of the device seems to be as good as paper. The device has had the same functionalities in mobility, they even went one step further than the mobility of a book. They gave you micro mobility by giving you an option of always continue reading on your iPhone, iPod Touch, or Blackberry device. This option of continuing reading was only for the books you were reading, and everything was wirelessly transferred between devices. The limitation with the Kindle device only got clear when you started looking at reading other kinds of documents like, word and pdf. It is not as much about the reading of these documents, but more about what kind of way you usually read these documents. The problem was that you can only read half a page at a time. You can not look at one page at a time, and even if you could the page turning time (1-2s) is enough to make flipping through the document like you do a paper document unpractical. Annotation was limited to one kind of highlighting (underline) and taking notes by using the keyboard. The pdf you could not even do that, you had to transform it to a kind of Kindle format before you could annotate. Transforming the file ruined all the figures and tables, the same happened to word files when you read them on the Kindle. As a last thought I would like to mention the interface to the device. The page turning was fine and natural, besides that you had next page buttons on both sides of the device. But to everything else on the device it seems a very long way from what you want to do, to the place where you have done it. From the PC world you used to having a mouse that is in a way an extension of your hand, in the smartphone world you're starting to get used to using your fingers directly for what you want to do. So to use the Kindle feels in some ways to go back in time, since you have to use equivalent of arrow keys. Since that is what the joystick you have on the Kindle functions as.

From the interviews we got some confirmation that the reading habits people seem to have in a work place is transferable to the university setting. People seem to be quite different in the level they take use of digital devices in their student lives. One of our subjects did almost all their reading on the computer, and all the note taking in classes and group works. Another person just used a computer when she was writing a paper, or emailing other students or professors. In all the other activities this person used pen and paper. The point of relation between paper and digital devices like computer is not high. Our subjects did not seem to at any time transfer their notes on paper to digital notes. Some subjects said they seldom read them again, but another told us they used them when writing a paper, or for reading before exams. In regards to group work it seems that there were some agreement between subjects that a laptop made it easier to share the information afterwards and can be used for a resource for information through internet. The downside of using a computer is that there seem always to be only one who took notes, one subject thought it was much harder to communicate with a person behind a laptop. Using paper in a group work setting

makes it easier to explain to people different concepts, easier to spread all the information out on the table.

Discussion

The four affordances of paper that Sellen and Harpers talk about in their book "The myth of the paper less office"

1. *Paper helps us flexibly navigate through documents.*
2. *Paper facilitates the cross-referencing of more than one document at a time.*
3. *Paper allows us to annotate documents easily.*
4. *Paper allows the interweaving of reading and writing. p.76 Sellen and Harper(2002)*

This four affordances is interesting to look at in the light of tablets. Is there some of this affordances you can get with the use of tablets. To navigate flexibly through documents is not possible with the kindle, the device is too slow and you can't look at a complete page. Other tablets that use different screen technology coupled with a touch screen has the possibility to cover this affordance. To annotate a document is possible on a Kindle and other tablets, the Kindle has some limitation on the annotation. You can just use one kind of highlighting (underline), and your notes can only be with the help of a keyboard. Because of this the Kindle is not as flexible as paper in annotating a document even if it supports it. On a document you are free to highlight with different colors, and by thickness of lines. You are also free to annotate the document with drawings, arrows, symbols, and text. Hopefully the new tablet like the iPad with support for third party developers will get support for annotating a document in flexible ways with the help of the touch interface. Affordances number two and four is a different question altogether. In some way you could say that it gives you a way of interweaving reading and writing, but you are dependent on another tablet or paper. The good thing about the tablet is.

Reading is so much more than reading a document or book from A to B. The figure 4.1 in *Sellen and Harper (2002)* reminds us of that, and the information we got from the interview makes us believe many of these kinds of readings are transferable to a university environment. If we look at these kinds of reading in comparison to how we are able to read on a tablet, this will tell us a little about the possibilities of tablets.

Work related reading	Kindle	Tablet
Reading to identify		?
Skimming		x
Reading to remind	x	x
Reading to search for answers to questions	x	x

Reading to self-inform	x	x
Reading to learn	x	x
Reading for cross-referencing		?
Reading to edit or critically review text	x	x?
Reading to support listening		x
Reading to support discussion		?

Taking notes on a computer forces you in a way to take longer and more complete/finished notes. The affordances with a pen, makes you take smaller notes, just because it is more tiring.

Thoughts about information on paper is more yours, than information you write on computer. Especially when you are trying to take notes form an article.

In the interview subjects talked about how it usally was only one person taking notes when they used a computer. It would be intresting to find out about if one person started taking notes on paper would have the same affect on the rest of the group. That one person is doing all the writing it could transform group work to being more of a sequential work flow.

Paper have existed for a very long time, hudreds of year in europe and way longer in China. The point is that we have had a long time to find out complex way of using paper. The first transistor that are one of the important building blocks of computing was not build before around 1950, and started geting used in computer in the 60s. So the electornic computer has had less than 50 years of life time, and the mobile computing has even had less time just about 30 years. One can also imagine that to manipulate electronic devices by our self is as far fecthed as it probably was for people in the early days of paper do all we now do with paper. So it is not so strange we have not got around to finding as many complex ways of using electronic devices as we have for paper.

Just look at the way some employes in a choclate fabiric in *Sellen and Harper(2002)* book used paper. They had a paper file for each supplier to the company, and this file was a organized in such a way that if the buyer (the employe) would have to go to a meeting with this supplier, get a phone call with question about the supplier. He only need to glance at the paper file for some brief seconds to get information form it. The information reset not so much in the paper that was in the paper file, but more in the head of the employe who owned the file. They knew what the document were by they memories of them, the suppleire relationship, and what the document triggered when they went through them. The physicality of paper gives it much extra meaning by where you lay it down. I paper in the

middle of the desk gives you a complete different picture than one on the side of your desk. Other complex uses were mentioned in *Mobility in Collaboration* article by Luff, P. and Heath, C. (1998). The medical record are another complex way people use paper. The doctor uses the medical record in different ways while talking to the patient, depending on what he wants to communicate. By having the medical record in the foreground, between him and the patient he communicates that he needs to read and not to be disturbed. By holding it in a slightly different position he can talk to the patient at the same time as he glances at the record. Other times the doctor can use it as a point of reference in talking and pointing at it, and lastly he can show the patient the record and discuss with the patient as they look at it together.

This leads us to the conclusion that paper easily makes us able to change the configuration of it to fit the setting or situation we are in. To do this with a computer laptop or desktop is not that easy. The setup of the computer is much more fixed and not so easily manipulated, you could turn the screen around so the patient could see but then you have to move the position of the sitting doctor as well. A tablet on the other hand could be manipulated in the same way the doctor used the medical record. The problem will probably be how to support input while standing and holding the device. It is clear that tablets like the Kindle are too little flexible in possibilities of inputting information. So touch screens tablet like the new iPad is probably the right way of going to solve this kind of problems. In the article Luff, P. and Heath, C. (1998) they also talk about ecological flexibility of the medical record gives it flexibility to be used in a range of activities as we talked about earlier. So if this is one of the strong suits of paper why has it not been a focus in designing new devices.

Thinking about how to support people to develop their own ecology of devices, while designing new devices is one of the problems Jung et al. (2008) identified as a problem for further studies in their article. The problem is based on that too many users use only part of their electronic artifacts (devices), people seem to use an artifact their own way regardless of the purpose of the design. As two different users put it in Jung et al. (2008), p.206 "I have an iPod though, but I rarely use it for music because I have another iPod, I use the Touch for checking my emails and schedules on the move or when I can not use my laptop..." and "I only save my music files in my home computer, Actually I use it more like a music player. I use my laptop for more professional tasks." There are also many users that say they do not use their camera or music player in their mobile phones. Is it possible to have a same concept as build your own pc, behind a smartphone. Is it too complicated for users, do they really know what they want and do not want. Sometimes it seems that people are surprised as often as not over which function they use in their electronic artifacts.

So on question I ask myself do we need a computer in every screen?

I talked about the solving the problem of

Is it the right solution to think of each screen size as different artifacts. Is it not possible to think of screen for what it is a way of showing information.

Conclusion

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