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The Fall and Rise of Information Appliances

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"in the late age of print, we see the move to heterogeneity and hybrid form, including on-demand printing from digital databases, printed books and magazines that refer to Web sites, Web sites that preview and sell books, and so-called 'information appliances' that combine the characteristics of books, notebooks, and calendars."

-- J. David Bolter

Abstract

This article examines the relationship between information appliances and the potential impact they could have on computer-mediated learning. The first section provides a stipulative definition of the term information appliance, and examines old, current, and emerging technologies to see how they may or may not fit with this definition. This is followed by a section covering the historical groundwork of first generation information appliances. It focuses on how they initially came into being, followed by a contextual framework explaining why virtually all of these early devices failed and why newer ones may succeed. The final section forecasts additional uses for these devices in computer-mediated learning environments in Bolter's late age of print, as viable tools to promote technology literacy.

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What is an Information Appliance?

What are "information appliances"? Are they the same as "Internet appliances", or perhaps Internet / email kiosks of some sort? Are information appliances stationary or portable? Are they personal digital assistants (PDAs) such as the Palm line of Treo products, or similar offering from HP, Motorola, and Blackberry? Are Internet appliances similar to the failed SONY Clie, dubbed as a "Personal Entertainment Device", or an iPod or iPhone? The answer to all these questions is yes. And no. Information appliances do not necessarily share the same form factors or feature sets, nor do they share the same operating system, connectivity, nor are they exclusively stationary or exclusively portable, necessarily wired or necessarily wireless. One characteristic they do share, however, is that in one form or another, information appliances likely represent the future of computer-mediated learning.

The TechEncyclopedia defines information appliance synonymously with Internet appliance, as "a device specialized for accessing the Web and/or e-mail, designed for ease of use". This somewhat vague definition is then qualified by the disclaimer that "The term is rather encompassing, and innovative products are expected all the time." (TechWeb, 2007) For the purposes of this text, I will stipulate my own definition: information appliances are multipurpose electronic devices, relatively compact, and connected. This is a notion similar to that of Vannevar Bush's detailed in *As We May Think*: a Memex-style, interactive device capable of sending and receiving information from a number of different sources. Bush, one of the primary architects of what we now know as hypertext, describes the Memex as:

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> a device in which an individual stores his books, records, and communications, and which is mechanized so that it may be consulted with exceeding speed and flexibility. It is an enlarged intimate supplement to his memory (Bush 1996, 32)

Admittedly, Bush's Memex was no less than desk-sized, so the similarities between the Memex and my own views of what features and functions comprise an information appliance perhaps end there. However, keeping in mind Bush wrote *As We May Think* in 1945, the monolithic form factor of the Memex is not entirely unexpected (in later works such as *Memex II*, the physical footprint of the Memex did appear to shrink somewhat, as well).

To me, for a device to be considered an information appliance, it must be able to do more than one specific task, such as store contact information or access email. If they only do one task, then that task necessarily defines what they are. For example, the Apple iPod shuffle plays digital audio files. That is all it does, thus it is a digital audio player or more generically an MP3 player, and not an information appliance. I realize it may also play digital audio files in other formats, as well, but the term "MP3 player" seems to have caught on from a marketing perspective, and is certainly easier to say and remember than "digital audio player".

Information appliances must also be somewhat portable, as well. I say this primarily because a lack of portability, to me, conjures up images of heavy, monolithic desktop computers, primarily designed with stationary access in mind. I suppose desktop computers are information appliances in the broadest possible sense, in that they are not limited to one task (such as, say, word processing), they are at least *luggable*, and they typically are connected. However, portability somehow seems more important now, particularly in our gadget-driven culture. In terms of computers, portability is steadily becoming a key factor. The desktop computer market

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has slowed to little more than a crawl over the past three years, while laptop sales have increased. In fact, according to technology industry analysts such as Gartner and IDC, laptop sales are steadily taking away marketshare from their desktop counterparts. (Kanellos 2003)

Aside from portability, this rise in portable computers has also been attributed to the popularity of wireless networking and broadband. (Smith, 2003) As such, am I further defining "portable" to mean less than three pounds, or less than 10 ounces? No, I am not. If it can be toted around fairly easily and in a reasonably convenient manner, for the purposes of this project I consider it "portable". [I should point out, however, that many new laptop computers just barely fit that category now. Some weigh-in at close to 10 pounds, which is hardly convenient and only moderately portable.]

Finally, information appliance must be "connected". I selected this term for intentional vagueness, as I do not necessarily mean to equate "connected" with "Internet-connected". In this case, such a device might only need to be connected to an intranet, or LAN, in order to send and receive information. It really depends on the context of how such a devices is being used, of course. Additionally, the term "connected" might also just refer to a high-speed serial connection of some sort, such as USB or FireWire, or could refer to a wireless connection method, such a 802.11b/g or BlueTooth. As long as the device is not a technological island, it can be considered "connected". As such, my definition of the term is perhaps more broad and open-ended than that of the TechEncylopedia, and really becomes more of an umbrella-like term that can refer to any number of seemingly different devices.

Why Early Information Appliances Failed

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The initial round of information appliances included much-hyped devices from experienced, well-financed companies such as 3com, SONY, and Compaq. These were integrated monitor / cpu devices, such as 3com's Audrey, that featured email and PDA-like capability, and were typically advertised as being household appliances no different than any other household gadget typically found in a kitchen or den. Along with these established players within the IT industry came several startups, such as Cidco and Larry's Ellison's New Internet Computer. While the companies themselves may not have had much in common in terms of their size, age, or technological footprint in home and education markets, their products all espoused a similar ideal: access, quick and convenient.

Yet, in spite of the collective marketing force of these companies, and in spite of the promise of easy access to information and a generally low learning curve, virtually none of these devices survived. Why did this initial crop of information appliances fail? Will emerging information appliances be any more successful? These questions about early information appliances did not go unnoticed within our discipline, but even then this attention largely focused on the potentially adverse effect these devices might have on literacy. It was the I-Opener, for example, that served as a catalyst for Gail Hawisher's remarks in *Accessing the Virtual Worlds of Cyberspace*. In reference to the I-Opener, Hawisher remarked:

> multi- and transnational corporations will make sure that they target this market and other large segments of the world's population for profit. Vast numbers will be able to browse the electronic world and make purchases, but will they be able to participate easily in the kinds of personally and educationally profitable activities of which we--the connected

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and educated of the world--now partake? These are the sorts of questions that trouble me (Hawisher, 2000).

Regarding the I-Opener, Hawisher certainly had a valid point. The concerns that troubled her about this device were not isolated. Not only was the I-Opener only capable of Internet access via Netpliance Internet access, but the device itself sported keyboard buttons used to exclusively promote commercial partners with Netpliance, even going so far as to include a "pizza" keyboard button for quick access to the nearest pizza chains that have established a business relationship with Netpliance. (Regan online) The utterly crass commercialism associated with the I-Opener was not lost on consumers, and the product was subsequently discontinued less than two years after the initial launch.

While not specifically addressing the I-Opener, Mayers and Swafford argue essentially the same point as Hawisher. In The *Reading the Networks of Power: Rethinking "Critical Thinking" in Computerized Classrooms*, they assert that if the true literacy-based aspects of technology are to be realized "it is our responsibility to rethink the technology along the axes of its larger social, economic, and political implications" (Mayers & Swafford, 153). In the case of the I-Opener, these implications proved to be too much of a hurdle for it to be used as a viable classroom technology, and even for it to survive as a viable information appliance.

The I-Opener was not the first information appliance to vanish almost as quickly as it arrived, nor is it likely to be the last. In the case of the SONY eVilla, the product was shelved before it was even publicly launched. While certain individual factors specific to these companies may have contributed more or less to the demise of their respective products, such as the "dot com" bubble bursting shortly after many of these products were initially heralded,

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causing a widespread vacuum in venture capital need for further research and development, the primary reasons were twofold:

- Many of these devices, such as the SONY eVilla and Compaq iPaq IA, cost nearly the same amount as a typical desktop computer, but provided significantly less functionality than one. Had the eVilla been launched as planned, it would have cost roughly $500, yet it was barely upgradeable it terms of processing power, memory, or connectivity. Since it relied on a conventional 15 inch CRT monitor for the primary display, the eVilla also took-up roughly the same footprint as a typical consumer-level desktop computer would. As such, why not instead buy a regular computer?
- Most of these early information appliances were essentially "sealed boxes" running proprietary software, capable of only connecting to specific Internet service providers (ISPs), rather than any ISPs. As the case with the Netpliance I-Opener exemplifies, it made little sense from a consumer perspective -- and absolutely no sense from an institutional perspective -- to purchase proprietary systems that could only connect to commercially affiliated service providers.

These flaws ultimately proved fatal for the vast majority of early information appliances. The majority of them proved to be little more than "false pretenders" on the path toward memex-like hybridization. In his groundbreaking text on electronic books, *The Future of Libraries*, Kurzweil defined the seven stages in the lifecycle of a technology. He asserted that false pretender technologies are as follows: "Here an upstart threatens to eclipse the older technology. Its enthusiasts prematurely predict victory. While providing some distinct benefits, the newer technology is found on reflection to be missing some key element of functionality or quality."

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(Kurzweil, 1992) Donald Norman echoes this sentiment about early IAs, as well, in *The Invisible Computer: Why Good Products Can Fail, the Personal Computer is So Complex, and Information Appliances Are the Solution.* Norman asserts that these early devices were largely "underpowered and overpriced, incapable of producing the results required by the consumer" and that they often duplicated functions available from existing technologies. (Norman 237) Ray Rischpater draws essentially the same conclusions. In his influential text *Internet Appliances,* he points out that:

> Few if any of these products remain today except in vestigial form in today's IAs. In many cases, the companies behind these products have changed direction or disappeared entirely. ...In other cases, more successful companies abandoned their efforts, or changed them so completely that the original products can no longer be clearly identified. (Rischpater 8).

The two notable exceptions were the New Internet Computer (NIC) and the Mailstation. These two survived slightly longer for different reasons, but their survival was ultimately short-lived. One of these devices probably had some potential as a tool for computer-mediated learning, while the other did not.

Why Some Newer Information Appliances May Succeed

The Mailstation, eventually purchased by Earthlink and briefly sold as the Mivo before being discontinued, never targeted an education institution demographic, likely due to its limited feature set. The device was roughly the size of a computer keyboard, having essentially the same footprint as the AlphaSmart Pro devices, and offered basic email and personal information manager functionality. Newer versions also sported a calculator and text-based Yahoo News

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articles which were auto-updated throughout the day. Those features represented the limits of the Mivo / Mailstation -- particularly given the small LCD display integrated into the unit. Earthlink attempted to offer this device essentially free after mail-in rebate, in exchange for a 1-2 year service agreement with a $10 - $12 monthly fee. As a low-end information appliance targeting a niche audience, this device perhaps met a need. As a tool for advancing technology literacy, it was not significant.

The New Internet Computer, commonly abbreviated as the NIC, was another matter. From a hardware perspective, it had essentially remained unchanged since it was first developed, right up until it and the NIC company itself were scrapped. This device could, at the time, "get away" without making drastic hardware changes primarily because the functions it performed, including web-surfing, instant messaging, email, newsgroups, etc., were not CPU-intensive. In fact, they were dependent more on bandwidth than processing power. Thus, even though the NIC used an obsolete processor, the fact that it also included an ethernet port compensated (assuming the environment where the NIC was to be used had such connectivity methods). The NIC was unique -- and to an extent still is -- due to it relying entirely on open hardware standards and open source software. In fact, when it was "updated" it was typically done so via a new software CD only.

Keep in mind, however, that these are just two devices from a previously dense field of several others. The fact that these two briefly survived at all, speaks little to these specific products and more to the failure of information appliances in general. Simply put, since the vast majority of these devices were overpriced, underpowered, and tended to go with proprietary

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solutions for much of their connectivity and/or functionality, most of them were fatally flawed from the start.

A somewhat similar example was made by Linspire, a company specializing in user-friendly Linux systems from serial entrepreneur Michael Robertson. At one point, Robertson hyped his Lindows Media Computer (the company name, at the time, was "Lindows" but was later changed to "Linspire" as part of an out-of-court negotiation with Microsoft). The device was billed as a "low-cost multipurpose computer" cost under $300, not including a monitor (Lindows.com 2003). The Lindows Media Computer offered television connectivity and other functions, including web browsing, email, chat, digital audio and video playback, and a full range of word processing and presentation options (via the included OpenOffice.org suite of programs).

While this device also came and went with relatively little attention, I believe it marked the beginning of a trend for Internet appliances: The Lindows / Linspire Media Computer offered a low price point, small form factor, and standard connectivity solutions (meaning it can use any ISP via a regular ethernet connection). It relied almost exclusively on open source software, and nonproprietary file formats. This meant that there was technically no way it could be "locked" down to only function with commercially-partnered services or overly-restrictive digital rights management (DRM) technologies, nor did it need to rely on annual contracts and licensing fees associated with proprietary files formats. OpenOffice, for example, uses open standard extensible markup language (XML) file formats for its word processing, presentation, and spreadsheet applications. This means they can be opened and accessed from a variety of competing programs, with virtually no data loss or corruption, or formatting issues.

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Additionally, these device used and relied on other standard formats for accessing audio, video, and text-based files, including Flash, PDF, Ogg Vorbis, MPEG 1 and 2, and HTML.

In short, Linspire and NIC created information appliances that had the potential to be flexible, easy-to-use classroom technologies that could have allowed our students to perform the vast majority of tasks they need to in order to technologically succeed in an academic environment. Creating such an ideal classroom technology in order to bridge the digital divide was actually a stated goal of both companies. NIC, for example, stressed their dedication to "up-leveling the quality and productivity of people's lives by providing the most simple, reliable and affordable computers for use in educational organization". (ThinkNIC.com, 2004)

Given the low price point and generally open-ended functionality of the NIC and Lindows / Linspire Media Center, I suspect later iterations of these or similar information appliances may eventually incorporate digital video technology and be near-ideal classroom solutions. Of course, Linspire is not alone in this pursuit. As PDAs and smartphones become more commonplace at home, at work, and in the classroom, and as these devices gain additional functionality and expansion capabilities by way of add-on peripheral connection cards, their collective potential for becoming viable classroom technologies increases. Many newer devices, such as Palm's Treo or Centro line, Windows Mobile variants such as the Motorola Q or the Samsung Blackjack, or Apple's iPhone or iPod touch feature wireless networking capability combined with email, web browsing, instant messaging / short-text messaging service (SMS), in addition to the typical personal information manager features available in all PDAs. Add-on expansion cards (for all except the Apple devices) provide memory expansion, GPS options, wireless network connectivity, VGA video-out (for connection to a projector), and a host of

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possibilities previously unforeseen even a handful of years ago. To a lesser or greater extent, many students, faculty, and institutions are adapting these devices for use in computer-mediated learning environments.

Many of my own students, for example, routinely bring their PDAs or smartphones to class, along with compact, folding keyboards, to take lecture notes, access online content via the wireless network connection available in our building, and to transmit information and files back and forth as needed (which involves a different, older method of wirelessly transferring data than that used in the previously mentioned wireless network zone). They are using and adapting these information appliances every day, with seemingly little effort, without my prompting them to do so. At this point, there appears to be a great deal of synergy between what my students want these devices to accomplish in class, and what the devices themselves are capable of actually accomplishing.

Conclusion: An Information Appliance Future?

Exactly what the future holds for information appliances is unknown, of course. Apple Computer's Newton, for example, was perhaps one of the first information appliances mass-produced for the public, and in some regards may have been responsible for creating the entire PDA industry as we know it today. When the Newton first came out, it was literally in a class by itself--typical PDA offerings from Palm and other competitors did not even exist.

Yet, in spite of the utter lack of competition, and in spite of advanced functionality ideally suited for computer-mediated learning (including word processing, handwriting recognition, Internet / email connectivity, and a array of expansion options), sales of the Newton were poor and Apple subsequently discontinued it in 1997. Problems associated with the

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Newton, such as initially poor handwriting recognition, expensive upfront price, and a necessarily large form factor (due to available components at the time not yet being miniaturized enough) ultimately proved fatal for this innovative device. Simply put, it was ahead of its time, and existed in a market that had not yet established itself.

However, if the Newton did not survive in a field wholly devoid of competitors, why would newer information appliances survive in a field densely-packed with competitors? Examples would include smartphones, the iPod / iPhone / iTouch, Intel's Ultra Mobile Personal Computer (UMPC) platform, "netbooks" such as the MSI Wind and ASUS EeePC -- which has been described as being not so much a true laptop, but rather "an appliance" (Smith, 2007, para. 8) -- and even open source, subscription-based products like Zonbu. Even if these devices survive and even thrive, will they be suitable classroom technologies? Will they amount to helpful tool to further break down traditional access-related hurdles associated with more costly technologies?

Given the necessarily fluid and evolving nature inherent in most information technologies, it is difficult to forecast how any of these specific devices might survive as viable tools for computer-mediated learning. There are simply more questions than answers at this point, as this current generation of such devices are relatively new and untested in the classroom. Yet, these devices ultimately represent both an opportunity and a challenge if we are to consider using them as classroom tools. In this late age of print Bolter, Kurzweil, and others have forecasted for so long, efforts to critically examine the potential of emerging technologies, and somewhat less-than-obvious information appliances, should be applauded and encouraged.

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