

Computer Games in the Developing World: The Value of Non-Instrumental Engagement with ICTs, or Taking Play Seriously

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Abstract—This paper argues that it is important to study non-instrumental uses of ICT, including computer games. Specifically, the article presents the results of qualitative and quantitative work spanning eight years of investigation in Central Asia focused on computer gaming in public Internet cafes as well as private spaces. The results presented demonstrate that people do indeed play games in resource constrained environments. The paper demonstrates that games constitute a significant portion of the ICT ecology in developing regions and provide a pathway to people’s “first touch” of a computer, that gamers have more frequent interaction with technology than basic Internet users, that games bring more diverse users to computers by providing a pathway to ICT use for people with lower levels of education, and that games can motivate innovation in the technology space. Additionally, our findings indicate that both genders engage in game playing. The article makes the case that games can be a source of informal learning about ICT, and as such, games and gaming culture in the developing world merit further study.

Index Terms—international development, Central Asia, ICTs, digital games, gender, Internet cafes, technology use, entertainment

I. INTRODUCTION

The Human Development Report is published by the United Nations every year. It’s an amalgam of facts and figures about infrastructure, health, agriculture, policy and other characteristics of most countries in the world that provide an overview of a country’s stage of development. The Human Development Index (HDI) is extracted from the report, and includes, among other things, measures for landlines per capita, Internet nodes, and mobile phones. The HDI, however, has no column for gamers per capita. Nor is there an entry for percentage of GDP spent on playing games, or amount of

online traffic absorbed by gaming related activity. There is no ranking of popular games in each country, or listing of most popular gaming cafes. There’s no comparison of how much it costs to play *Counterstrike* or how many youth under the age of 15 are estimated to have consoles in their homes. The HDI, in short, ignores games as an element of information and communication technology infrastructure within a country. Games, in fact, are invisible to the UN, as they are to just about every non-governmental organization and multi-lateral organization that has worked to create information and communication related projects in the past decade or more. The goal of this paper is not, actually, to argue that the HDI should include computer games as a measure of development. However, the purpose is to establish that games lead to learning computer skills and that, indeed, games are played by people throughout the world. Games are in fact a pivotal piece of a country’s computerization, how its population gains information and communication technology (ICT) related skills, and how ICTs themselves begin to diffuse in developing world contexts.

II. GAMES, LEARNING, AND CULTURE

There is a robust academic community dedicated to exploring the connection between games and learning, drawing heavily from both education and psychology. Games are an increasingly central topic in educational research, with scholars researching games as part of informal learning [28], key skills like collaboration that people learn while playing multi-player games [29], psychological and reaction time skills gained from games [36], and the creation of actual educational games designed to teach complex skills [6,7], [9,10] [30].

As a companion piece to academic work, significant attention and dollars have been targeted at exploring the issue of games and informal learning in the US (e.g. the MacArthur Foundation’s 5-year, \$50 million project on Digital Media and Learning and the Robert Wood Johnson Foundation’s \$8.25 million program in Health Games Research). There are also organizations dedicated to NGO-like activity around games, including the Serious Games initiative, Games for Change, and Games for Health; these groups focus on developing games with explicitly pro-social goals in mind.

Much of the research in the games and learning area has focused on the learning that occurs while people engage with

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games. Developing world initiatives include work by groups such as the South Africa-based Mindset Network which has developed mobile phone-based games to teach math skills to girls (Mathstermind and Fashion Network), and literacy and numeracy games for disadvantaged youth developed by Pratham in India. These specific pro-social gaming projects similarly focus on in-game content and what people can learn as a result of playing.

This paper, however, is more interested in how engagement with games serves as an ICT usage entry point. In other words, not what do people learn because of a specific game, but, rather, what do they learn because of the specific activity of gaming. To that end, this paper focuses attention on the commercial game space and how it diffuses throughout and affects nascent computer users in developing regions. This question of effect can be situated within a theoretical framework tied to cultural theory that investigates issues of identity and agency. Generally, cultural theory provides another lens through which we can view the importance of digital artifacts that transcends their literal or functional meaning [32]. Again, in the most broad terms, cultural theorists such as Bruno Latour [35] provide a framework against which we can examine technological artifacts not for what they are, but for what they enable. That is, games and non-instrumental uses of technology are important in the developing world not (only) because they teach people to collaborate or improve language skills, but, as this paper will demonstrate, because they provide an alternative mechanism by which many people experience their first “touch” of a computer. Additionally, we found that games allow users with less education and English language skills to interact with computers, and that they foster innovation and creative engagement with technology.

III. METHODOLOGY

Our research is the result of longitudinal qualitative and quantitative work done as a component of a larger project on the effect of information technology on society. The Central Asia Information and Communication Technology Project (CAICT) is a multi-year study of ICTs. The project goals include investigation of how ICTs diffuse within societies, how cultural issues affect technology usage, and how patterns of trust and confidence in media and institutions change over time as technology diffuses in diverse communities.

A. Survey

The project includes a yearly survey of four countries in Central Asia: Kazakhstan, Kyrgyzstan, Tajikistan, and Uzbekistan. The quantitative results presented here are based on the nationwide survey of 1000 respondents in each of these four countries age 15 and older, administered in 2006, 2007, and 2008, for a total of 1000 respondents per year per country, and a total of 12,000 respondents overall. Survey sample was based on census information for age, gender, ethnicity, and geographic location as released by each country’s government. The survey includes multiple urban and rural sampling

locations, and it was administered in Russian and other regional/local languages. In addition to the general sampling scheme, a three-stage process was used to select respondents that included Probability Proportional to Size sample of Primary Sampling Units (PSUs); consecutive random sampling of households in each PSU, and selection of a household respondent using a Kish Grid method.

The survey instrument was designed by a team of researchers from the University of Washington, pilot tested in each country in conjunction with local researchers, and then revised based on analysis of pilot data. BRIF Research Group, based in Kazakhstan, translated the survey instrument from English to other languages. The University of Washington team back translated the completed Russian translation. Likert scale measures and other question formats were developed in response to initial open-ended interviews, ethnographic field notes, pilot tests and research on performing surveys in post-Soviet contexts. Several steps were taken to guarantee high quality fieldwork including: (1) approximately 30% of interviews were checked through a back visit to the respondent’s home; (2) interviewers were trained through workshops and practiced in a pre-testing phase; and (3) statistical analysis of logical inconsistencies were double checked with the original paper questionnaires and eliminated if necessary.

Given the low rate of current Internet penetration in Central Asia, the survey also focuses on pre-existing patterns of information use, information seeking behavior, and levels of trust in various producers and sources of information.

Since Internet usage rates in the region tend to be low, the survey targets the general population rather than Internet users; the findings include overall attitudes towards technology from a wider audience rather than simply usage patterns from a much smaller group.

B. Ethnography

Ethnographic results are from the CAICT project as well as earlier fieldwork conducted by the first author during a six-month residence in the region in 2000. Fieldwork data collection methods follow standard ethnographic format for participant-observation and include field notes and photography.

In addition, interview studies have been conducted with various groups to further investigate issues relevant to survey findings. Qualitative data reported in this paper are drawn from multiple separate studies conducted in 2005 and 2006 including interviews with Internet users, interviews with mobile phone users, interviews with computer gamers, and a design ethnography. In addition, ethnographic observations are based on field notes collected during separate data collection trips in 2000, 2002, 2003, 2004, 2005, and 2006.

IV. BEYOND STEREOTYPES OF GAMES AND GAMERS

Before addressing the specific ways in which games provide an important pathway to ICT engagement, it is important to deconstruct some of the stereotypes of games and

gamers. Recent research has begun to establish that gamers in developed countries are not all male and not all teenagers [33-34], that in fact the audience for games is diverse in terms of gender and age [1][22-24]. Studies of complex multi-player gaming environments, for example, demonstrate that although male players outnumber female players, it is those female players who actually spend more time online playing [25-26]. Games themselves come in many flavors, including the violent shooting games that gain so much press attention, but they also include puzzle games and simulations. Game systems such as the Nintendo Wii or games with alternative input modes like *Rock Band* or *Dance Dance Revolution* have similarly changed the cultural activity of games and broadened the audiences to which they appeal [27].

While not identically diverse, gamers internationally also belie some stereotypes. While gamers are still more likely to be male and under 30, in our research population, female respondents and those over 30 were as likely to play games as they were to use the Internet, See Figure 1. This finding indicates that depending on the population segment, gaming is either a more used pathway to ICT use than the Internet, or it is at least equivalent.

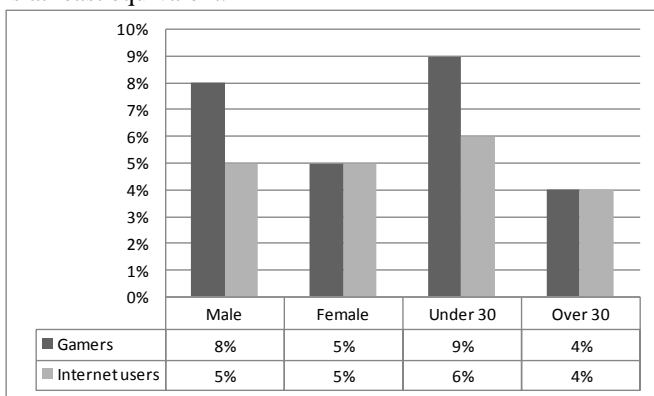


Figure 1: Demographics of gamers vs. Internet users

V.SETTING THE STAGE: GAMING CONTEXT IN CENTRAL ASIA

Public gaming centers in Central Asia meet many of the preconceptions of computer game culture, but they are also nuanced environments. The crowds of young boys that are seemingly ubiquitous are reminders of gamer stereotypes, although our survey results indicate that women do indeed play games (see Figure 3), although women tend to play at home rather than in public cafes.

Many of the popular game titles are familiar, but the style of play and the mechanics of getting the games to work in different infrastructure environments are unfamiliar. *Counterstrike (CS)* and *Starcraft* are literally everywhere, and kiosks on the streets sell countless numbers of CS mods, the cd covers in English and Russian. *Starcraft* competitions can be found in many of the capitol cities in the region, see Figure 2, and the World Cyber Games are a coveted destination (and Central Asian countries have placed quite high in the World Cyber Games in recent years).



Figure 2: Photograph of Starcraft competition announcement outside Kazakh game club

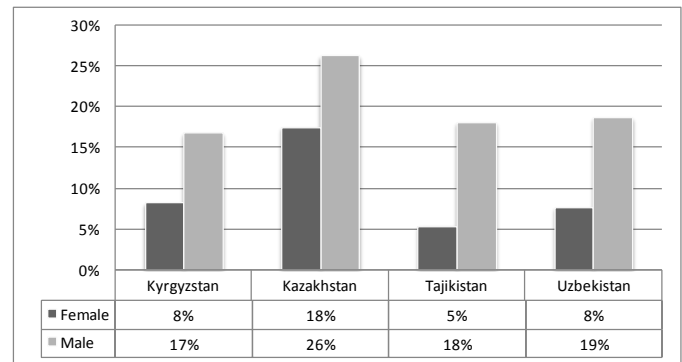


Figure 3: Male and Female Gamer Populations in Central Asia, 2008

Internet cafes vary in quality of equipment and furniture. Some businesses will have recent equipment, flat panel LCD screens, and glossy office furniture; others have older PCs, CRT monitors, and plastic chairs. Often the ones that feel more like a business center are located in the center of the city and cater to a mixed clientele. However, businesses located in neighborhoods similarly can serve a diverse clientele, although not necessarily at the same time. And games exist in a context of ICT diffusion overall, with Internet growth creeping slowly and mobile use skyrocketing, see Figure 4.

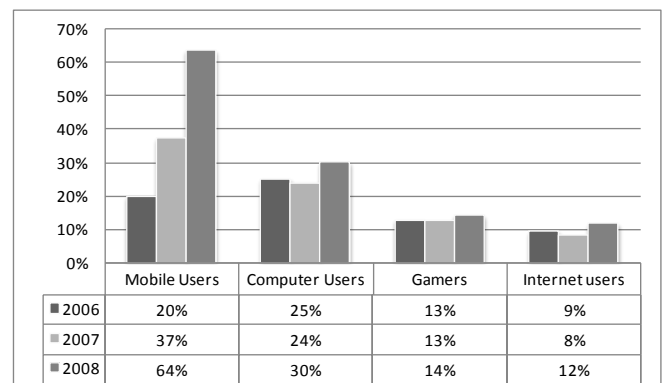


Figure 4 Relative Rates of ICT Usage 2006-2008

A. A Tale of Two Tajik Internet Cafes

Plazma is an Internet café located in the center of Dushanbe, the capital of Tajikistan. Plazma is on Ryudaki Street, the central boulevard in the city. It is located in a two-story standalone building, with a very large sign on the side advertising a bar and café on the first floor, and Internet center, computers, fax, IP telephone, and other services on the second floor. Plazma is typical of centrally located Internet centers in the cities of the region in that it offers a wide range of services. However, it is also a particularly good example of a business that has specifically not bifurcated into two separate establishments in order to accommodate both gamers and a growing population of Internet users. Plazma has, instead, blended the two business models and offers a central room with ten computers with Internet access arranged on long tables but separated by small tabletop dividers to allow privacy, 3 IP telephone booths, a central desk where items can be photocopied, text typed, faxes sent, and – very welcome in the Tajik summer – air conditioning. There is also a sign posted in each mini workstation providing some guidance about usage that reads in both Russian and English: “It is categorically not allowed to visit sites with pornographic photos and video materials. In case of visiting above mentioned sites, administration has a right to fine you from 80 up to 300 somani,” the equivalent in 2006 of US\$23-86. The sign serves not just as instruction not to visit porn sites, but also as a not-so-subtle reminder that one’s online activity is being constantly surveilled. What should be obvious, of course, is that the specific sites or what constitutes pornography is left open to interpretation. That signage echoes signs in Uzbekistan cafes that warn about “inappropriate content” which can be either pornographic or political.

On the same floor, but in a separate glass enclosed room is the gaming center with 28 game stations preloaded with games such as Grand Theft Auto, Cossacks, Need for Speed, Call of Duty, FIFA, and Half Life/CS and equipped with high quality headsets. On the wall in the main room where the business services are offered is a large embossed sign that runs the length of the room that has the site’s web address as well as their tagline in Russian and English: All Our Life is a Game. The manager reports that *Counterstrike* and *Starcraft* are among the most popular games at the café. During the school year the café is crowded, but during summer vacation students visit less often – presumably because they spend less time in the center of the city. The customer base for the gaming stations ranges from schoolchildren to adults, and the adults tend to call ahead to see if a station is free and what games are in session before they come to the café.

Using the services in Plazma costs two somani an hour to play games and four somani an hour to use the Internet. The ratio – games costing half what Internet access costs – is in line with general trends in the region. As argued above, when Internet access is metered and slow, the price differential between playing games and browsing makes it increasingly attractive to see games as the open-ended entertainment activity associated with computer technology rather than aimless browsing or opportunistic link following.

Gigant 2 is located on the edge of Dushanbe in a residential neighborhood. It is located in a one-story strip of local businesses, There is a bread store on one side and a small dry goods market on the other. On the sidewalk in front are several women selling seasonal fruit. Gigant 2 has streetside signage advertising Internet services, prepaid IP telephone cards, DVD/VCD and VHS rentals. The café/club rents movies, burns DVDs and CDs, and offers multimedia services.

There are 24 stations in the main room of Gigant. There is also a back room that is attached to the main room and separated only spatially. There are six stations in the back which serves as a VIP room and includes two couches and a large floor fan. Gigant is nominally air conditioned, and heavy plastic sheets hang as a barrier at the front door to keep the cooler air inside, but in the height of summer it is very warm inside. There are two IP telephone booths in the café, and a site-wide LAN for watching movies. Dozens of games were preloaded onto the machines, but *Lineage*, CS, Need for Speed, and Cossacks were reported to be most popular. The business remains open all night, and from 9pm to 6am the only services offered are Internet access and *Lineage*. CS was not offered during the overnight because it was too difficult to find many other players online during that time frame.

Gigant has a three tiered pricing structure, similar but not identical to Plazma, see Figure 6. Playing games costs one somani per hour, being “online” also costs one somani per hour, and “Internet” costs 2.5 somani per hour. The distinction between online and Internet is something that appears with some regularity in developing regions, and it is a further motivation for individuals to develop usage patterns that downplay the importance of open-ended web browsing. In the case of Gigant, online activities include chatting, but Internet means web browsing since ISPs often charge by the kilobyte. Under those circumstances, then, browsing can be extremely costly and, perhaps even more of an inhibiting factor, not particularly transparent in terms of expense.



Figure 5: 2006 pricing structure at Gigant 2: Games 1 somani, Online 1 somani, Internet 2.5 somani

Gigant is a café that melds general Internet services and gaming into one space. In the afternoon, it was packed exclusively with schoolage boys. The manager asserted that in

the evening, when adults returned home from work, the clientele turned over. Indeed, around 6 pm, some of the boys drifted out, but increasingly adults – including women, began coming into the business.

These two profiles capture many of the business environments where people play games in developing world contexts. Their public nature, idiosyncratic policies, and tiered pricing structures are common elements and evidence of variability across venues.

VI. FINDINGS: GAMES AS A SIGNIFICANT PART OF AN ICT ECOLOGY AND POTENTIAL SITE OF A USER'S FIRST "TOUCH" OF A COMPUTER

Throughout this project, we have maintained a focus on the study of diverse users' information landscapes -- their ICT ecology. In other words, this work takes particular interest in how specific pieces of ICT form unique mosaics in different usage contexts, giving individuals and communities access to variable modes of interaction, communication, and information-seeking. What has become clear over the years is that games and gaming provide an important – if often overlooked – piece of this puzzle [15]. Often dismissed as irrelevant to capacity-building projects, overlooked as a measure of a nation's ICT sophistication, and prey to countless stereotypes about users, games are a largely invisible component of the ICT landscape in developing regions. However, from the standpoint of users gaining facility with ICTs, and allowing ICT-related industries to gain an early foothold, games play an important role as they are often the first attractor – the first ICT with stickiness – for novice users. In other words, games are an alternative pathway to some users' first 'touch' of a computer.

On a functional level (as well as philosophical level), ICTs mediate distance and time [2][3][19]. In a country such as Kenya or Cambodia, nations with poor road infrastructure, the ability to transfer information quickly and over large distances has a transformative effect on the kind of information environment within which people live. On the other hand, there is also the conceptual mediation ICTs play as they bring fractured components of the globalization narrative to small communities that might otherwise have very limited exposure to outside media influences. In Central Asia, ICTs are a linchpin of economic development as well as a symbol of modernization. Computers in schools projects bring technology literacy to youth, e-government initiatives slowly bring elements of government online and into some version of transparency, and within certain professional sectors computers streamline practice and make international collaborations more effective.

However, when such top-down initiatives are bracketed, and instead focus is placed on bottom-up patterns of technology diffusion, ICT usage follows a different narrative. Adoption and usage patterns that emphasize ICTs for communication, gaming, and entertainment emerge. From movies to games to ringtones, ICTs become attractive to everyday people for non-work purposes. This pattern runs

somewhat counter to assumptions made about users in resource-constrained environments, but the so-called frivolous uses of technology are, indeed, often what brings people through the door [31].

The sheer amount of game activity and gaming culture revealed by longitudinal ethnographic work in Central Asia establishes the importance of games as a part of ICT ecology in this resource-constrained region. And when schools are not wired and home access rates are low, game cafes are likely places for people's "first touch" with computers. (Figure 7).

A. *Nurturing public Internet access sites in early years: the role of games*

In the past several years, a number of studies of Internet cafes have demonstrated the importance of such public access sites for users in emerging markets and other developing regions; many of these studies have focused on NGO-sponsored telecenters rather than commercial sites [4-5][8][11-13][18][21]. Generally speaking, though, in the global south, access to the Internet is more often in public, shared space than it is in private homes, or even the workplace or school. There are several characteristics of public access usage, however, that mean people's relationship to the Internet develops a particular shape. [17] Public access generally brings an awareness that one's usage is economically constrained, metered by time and often by kilobyte, inhibiting the link-following that characterizes much Internet usage in broadband contexts.

Internet cafes, for the purposes of this discussion, are publicly accessible commercial or noncommercial sites where people gain access to a variety of ICTs, including Internet, IP telephone, photocopying, faxing, etc. Many commercial sites augment their income by providing some café-like amenities, but often the name "Internet café" is conceptual only. But Internet cafes are also often the first places that ICTs come to communities in developing world contexts. Whether established by an NGO or a local entrepreneur, Internet cafes advertise novel services to a community that is largely technologically illiterate, and they then face the challenge of convincing people they have a need for services they do not know how to use. Indeed, the capabilities of the Internet are themselves somewhat opaque to individuals who have not been exposed to a new media infused environment, and games are often a way to first draw people through the door.

The research conducted in Central Asia from 2000-2007 pointed to an evolutionary pattern for commercial public access sites. To illustrate, take the example of Tashkent, the capitol of Uzbekistan. Tashkent is a city of approximately three million; it was the fourth largest city in the Soviet Union. In December of 2000, there were twelve operating Internet access points in Tashkent. This list included two sponsored by NGOs or large multi-lateral organizations, one funded by a local cultural center, and nine commercial cafes – most of which did not actually serve food or drink. That number has since grown to the hundreds, and the actual number is impossible to estimate given the fact that many operate without being fully licensed by the government, signage can

be missing or misleading, and there is no reliable central directory of all functioning businesses in the city. However, it is safe to state that the Internet business in Tashkent as of 2007 was thriving. Home access is growing, numerous ISPs offer local dial-up service, others offer DSL, and schools and businesses are increasingly getting Internet access.

In 2000 (the early years of Internet diffusion), it was not immediately clear to individuals why they should spend about US\$1 per hour to use something that had linguistic and technological barriers, particularly in a country where the average monthly salary was US\$20-30. Interviews with novice users over the course of five months in 2000 pointed to such confusion and illustrated the cultural gaps that acted as additional barriers to entry for new ICT users. There was an absence of external information resources in people's lives, so using analogies to describe the Internet as, for example, like yellow pages or encyclopedias was not particularly resonant. Keyboards were often in English yet people spoke Uzbek or Russian and needed the Cyrillic alphabet. Operating systems and software were often in Russian which was an additional hurdle to Uzbek speakers (Uzbek is a Turkic language, not Slavic). Printer drivers didn't have the Uzbek character set, there was very limited content online that was relevant to local inhabitants, and keyboarding or typing skills were not common. Literacy rates themselves were quite high, although the multi-lingual nature of life could make reading and writing a bit more complicated depending on primary and secondary language ability. [14][16]

However, because copyright laws were loosely if at all enforced, there was no shortage of entertainment media available. The latest games could be bought for about US\$1 in kiosks on the street, and VCD movies were about the same price. At the same time, games could be played either standalone on individual computers or over a café-based LAN. Alternatively, movies could be watched on the computers by an individual or a group. Cafés developed a two-tiered pricing structure where it cost roughly half as much per hour to play games. What emerged, then, was a pattern of usage in these Internet cafes where the majority of customers came in to either use computers to type documents (also much cheaper than Internet access), or to play games. During the day, schoolchildren would come to play a variety of games, and often café owners would let the youngest children hang around and watch movies or play games if the café was otherwise empty. Playing games provided young people with their first experiences touching computers. Playing demystified the technology, allowed them to gain keyboarding skills, taught them how to navigate operating systems and GUI menus, and generally build comfort and facility with computers. In those early days, in 2000, it appeared that revenue from activities other than Internet usage allowed Internet cafes to remain open in their communities.

Although it was impossible to get owners to disclose actual revenue figures, in conversation and observation over the course of six years of field visits, it became clear that for many businesses, the revenue generated by game players helped sustained these early adopter businesses. Consequently, when

a community member did need occasional access to the Internet, there was in fact a local site to visit. However, without games and other non-instrumental uses of the computers, the businesses would have had a much smaller regular customer base on which to draw. We would argue, then, based on our interviews and observations that games played a pivotal role in the ICT diffusion within that country. And once people started playing games, particularly LAN-based games, they began chatting and utilizing other communication tools. Their usage of ICTs expanded beyond games, but it was the gaming activity that allowed them to enter the so-called information society.

B. The appeal of games as a pathway to ICTs compared to other technologies

While initially games might have been appealing because they were an inexpensive way for users to begin experimenting with computer technology, there was also a functionality argument in favor of them. In many developing world contexts, including Central Asia, Internet access tends to be fairly slow. Often an Internet café will have a dozen or more computers sharing one dial-up or DSL line. Such bandwidth limitations play out, for example, in a contemporary web page from a more developed country taking two or three or five minutes to load. In and of itself that may not seem a hurdle, but the time adds up.

Using a basic free webmail application like Yahoo or Hotmail becomes an exercise in patience. To write an email in Yahoo mail, for example, takes about six page loads: one to load mail.yahoo.com; a second to enter a username and password and wait for login authentication, a third to click on the *inbox* and check mail; a fourth to click on *compose* to write a message; a fifth to click on *send* and wait for the message to go out; a sixth to click on *check mail* again and be returned to the inbox. Do the math, and suddenly it's 20-30 minutes to write one email – and that's without having to check someone's email address by loading the addressbook. Because these are public Internet sites, pop mail or SMTP is of limited utility, and so webmail quickly became the mail application of choice. However, people were forced to use webpages created in 2000 with access speeds more approximate to 1995. The Internet, then, was simply not perceived as terribly efficient; indeed, it was not at all efficient. Opportunistic web browsing was not a habit easily adopted when web pages took so long to load. Expensive and slow, the Internet was a window to frustration rather than a window to the world.

Added to this limited utility, however, was a slightly more acute problem of surveillance and censorship.. Many Internet cafes had signs posted warning that accessing inappropriate content would result in fines or arrest. The managers or administrators would sit at a desk and monitor traffic; users were crowded elbow to elbow with very little privacy for the items on their screen. Inappropriate content was rarely if ever defined. Sometimes it was specified as political information, or inappropriate political information; other times pornography was banned. But what constituted inappropriate

political content could change; a website with acceptable regional news one day might be overly critical of the president the next and suddenly be on the banned list. The habit of censorship and surveillance for one's Internet usage provided another tamping mechanism for Internet use at the Internet cafes, and another motivation for those who wanted to learn about computers to gravitate toward games.

Amidst all this gaming in the region – activity that was economically as well as socially appealing, gaming-specific centers gradually emerged. While game playing allowed Internet cafes to remain open in the early days of ICT diffusion, eventually the industry matured substantially enough that gaming centers split off from Internet cafes. There were enough Internet users producing Internet-only revenue that many businesses could focus on one or the other. Many crossover businesses remain, especially in countries with lower percentages of Internet users (Uzbekistan, Tajikistan), but one can see that as the sector matures and a business can take in enough revenue from Internet access to remain sustainable, that game cafes separate themselves from Internet centers.

It is not a zero sum game, though, and as the numbers of Internet users grows, gaming remains a vibrant activity. Indeed, the presence of multiple gaming centers throughout the region – particularly in the capitol cities -- makes it clear that games are being played, both players and games are diverse, and gaming provides a social interaction platform.

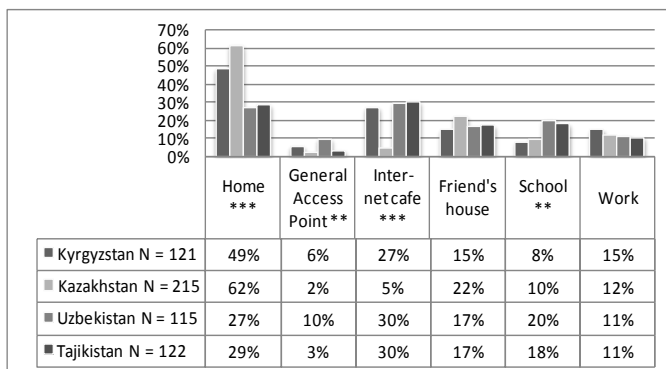


Figure 6: Sites of Gaming in Central Asia, 2008
 *** = $p < .001$; ** = $p < .05$ Statistics based on Chi-square test

VII. SURVEY FINDINGS: LESS ADVANTAGED USERS MORE LIKELY TO GAIN INTRODUCTION TO ICTS THROUGH GAMES

As discussed in the previous section, games can provide a mechanism by which youth can be drawn into ICT training centers, and games also provide a revenue stream for owners of public access ICT sites. Additionally, our survey results demonstrate that games offer tangible assistance in overcoming barriers to entry for novice users by allowing users with less education and English language skill to gain experience with ICTs.

In order to explore potential barriers to entry for novice users we wanted to first identify what types of people play games compared to those that use the Internet, In other words,

we wanted to identify those users who overcame the barriers to entry for either activity. Our goal in this exploration was to investigate if the two groups differed, and if so, how they differed and what the differences would suggest about potential barriers.

Two direct logistic regression analyses were performed using SPSS to predict gaming and Internet use outcome from eight predictors: (1) age; (2) gender; (3) years of schooling; (4) living in a rural or urban environment; (5) mobile phone use; (6) ability to speak and read English; (7) ability to speak and read Russian; and (8) socio-economic status reported on a scale of one to three.

A. Comparing predictors of game playing to Internet use

First, we analyzed game playing. A test of the full model with the set of predictors against the null model with no predictors was significant, $\chi^2(9, N=12000) = 2268.52, p < .001$, Nagelkerke $R^2 = .317$, indicating that the set of predictors reliably distinguishes between individuals who play games and those who do not. The approximate variance in predicting game playing accounted for by the set of predictors is 32%.

According to the Wald criterion all eight variables reliably predicted computer gaming--listed here in order of influence: (1) age; (2) ability to speak and read Russian; (3) owning a mobile phone; (4) living in an urban environment, (5) gender; (6) ability to speak and read English; (7) years of education; and (8) SES.

Next, we analyzed Internet use. A test of the full model with the set of predictors against the null model with no predictors was significant, $\chi^2(9, N=12000) = 2852.51, p < .001$, Nagelkerke $R^2 = .447$, indicating that the set of predictors reliably distinguishes between individuals who use the Internet and those who do not. Internet use accounted for by the set of predictors is a striking 45%

According to the Wald criterion, all eight variables reliably predicted Internet use--listed here in order of influence: (1) ability to speak and read English; (2) age; (3) years of education; (4) owning a mobile phone; (5) living in an urban environment; (6) ability to speak and read Russian; (7) gender; and (8) SES.

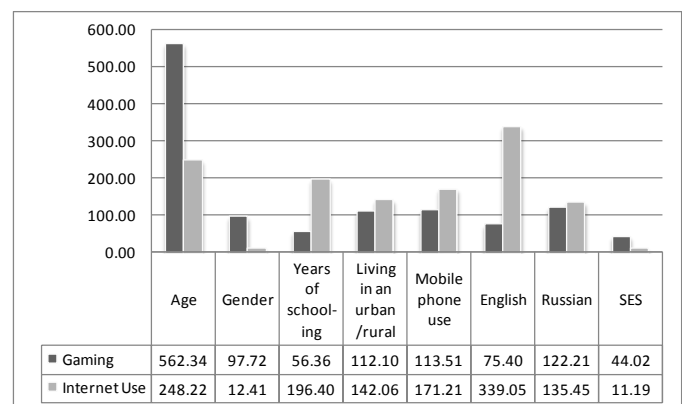


Figure 8: Predictor effects on the models according to the Wald Statistic

While the sets of predictors are the same, there are notable differences. First, the set of variables does a much better job at predicting Internet use than game players, indicating there is more homogeneity in the Internet using population; however, both models were very good at predicting the outcome. Second, the importance of individual variables is different. Whereas the ability to speak English is very important to predicting Internet use, it was less influential on game playing. Additionally, education level is very important to predicting Internet use, but not as much for computer gaming. Conversely, age is a stronger predictor of gaming. Together, these items suggest that entry into the game playing realm is more accessible to a different segment of the population. If the goal, then, is to broaden participation in ICTs, games provide a pathway to ICT usage for users who would not necessarily have the education or English language ability to become Internet users. See Figure 8.

This finding is significant in that it clearly establishes that gaming and Internet use attract different segments of the population, and that an individual's likelihood to gravitate to one version of ICT over the other is not only due to availability or interest, but is also due to societal factors such as education.

VIII. FINDINGS: GAMES AS A GATEWAY TO AND MOTIVATION FOR INNOVATION

The strong attractor force of games can also be a motivator for innovation. Many games encourage users to become active participants in a digital environment, and the enthusiasm many players feel for games can motivate them to learn new technical skills in order to facilitate their playing.

A. *World of Warcraft*

Blizzard's *World of Warcraft* (WoW) is a subscription-based game that requires Internet access. It is a massively-multiplayer game that has thousands of players on each server. Much of the gameplay relies on collaboration, and players form guilds; trade happens in auction houses, and the game requires a certain critical mass of players to run effectively. The technology and banking infrastructure required by *WoW* would seem to relegate it to an impossible game in the context of Central Asia, a region with relatively slow Internet access and essentially no credit cards. However, in at least two of the capitol cities in the region, local ISPs have devised a way to offer *WoW* to their subscribers.

Locally run servers allow DSL subscribers to play in-network, so, for example, there is a Tashkent-wide version of *World of Warcraft*. The game is in Russian but with a server attached to the provider. Most of the people are from the capitol given the pattern of DSL diffusion. Players recruit friends and classmates, but because of the low in-game populations, the basic mechanics of the games are different from standard play in developed world contexts.

For about UD\$12-13 per month, players get unlimited hours online with both WoW and ICQ. All other Internet activity is metered by kilobyte, and MSN and Yahoo Messenger are metered as well. As for WoW, there are only a few hundred users online in the world, which means there are

very few guilds, and the auction house is not a particularly effective mechanism for trading goods. While economically viable in this context, Azeroth, the world of *WoW*, is also a largely empty world for these players. However, clearly the online game has a draw, as do many other game genres. The local hacks that people use to be able to play games are a testament to the appeal that games of diverse genres have for users.

B. *Games as motivation to gain technical expertise*

Similar local adaptation can be seen among local gamers in Bishkek. A group of, neighbors, residents of the same large apartment building, discovered that they all liked to play the same games, but they preferred to play at home because they saw it as cheaper and they had "more freedom." So they ran a LAN down the outside of their nine story Soviet style flat, connecting eight neighbors together so they could play together. Gamers display a fair amount of creativity in ensuring they are able to remain connected with global gaming culture. Their narratives of themselves as gamers, however, emphasize the public and social aspects of their gaming which is not necessarily consistent with gaming in the US, but does resonate with gaming culture in Korea and China.

One of eight Kyrgyz gamers interviewed in 2006, Yuri echoed the pattern of games as a motivator for learning more about technology. He started playing games in the 4th grade, and was introduced to games by playing *Flight Sim* at a friend's house, long before computers had been introduced to his public school. After *Flight Sim*, he began going to computer clubs where he fell into the world of *Counterstrike*. Now 19, he plays games over a LAN only in the clubs because, as he says, Internet is too expensive. After playing for years, he gained a variety of computer-related skills and now works as an administrator at a game café. He calls his friends and arranges for them to come after hours and gather together to play. Although none of the other gamers interviewed in Kyrgyzstan in 2006 had direct stories of their gaming leading to jobs, they did all emphasize the collective, shared knowledge of their gaming circles, the enjoyment of gathering in public places together to compete, share, and improve skills.

Their stories also stand in contrast to the usual ICTD narratives about how newcomers become first acquainted with ICTs and the associated information society. Often, development projects that incorporate technology emphasize instrumental uses of technology. Games, however, are part of an open-ended and alternative exploration of technology.

IX. CONCLUSION

Much of the research on game culture concerns itself primarily with gaming in extremely developed contexts – where resources are abundant, and where gamers' relationship with technology has evolved in the context of that abundance. Game culture is just as interesting, and just as vibrant, and just as reflective of complex social dynamics when it takes place in resource constrained environments and when the gamers who adopt these technologies have very different relationships

with the technology. Central Asia is one such resource constrained environment, and while the specifics of the region give it particular political and economic constraints, the stories that emerge of games' importance in allowing ICTs to take hold during early stages of technology diffusion, as well as the persistent public nature of gaming activity help to broaden the picture of what games can be and what purpose they can serve within an overall ICT ecology.

It may also be that gaming culture is the non-instrumental use of ICT that can parallel some of the adoption stories for mobile phones. Games are fun, and there's nothing wrong with fun, even in a development context. If talking to friends and family is part of the leverage that gets people to adopt mobile phones, then playing with friends may be part of the leverage that gets young people to develop further skills with computers.

As we have argued in this paper, gaming culture is vibrant and thriving, and it provides a potential "first touch" with ICTs, especially for people who may not have access to computers at home, work, or school. Additionally, our survey demonstrates that games provide different barriers to access than Internet usage, broadening the reach of ICTs. Finally, games and the enthusiasm that gamers have, can motivate innovation and technological skill acquisition.

Ultimately, the goal of this paper has been to bring attention to games and some of their possibilities as an element of ICT ecology in resource constrained environments. Games have been almost completely ignored by the ICTD discourse, and as the community seeks to better understand how and why people adopt ICTs into their lives, it seems important to include entertainment-related uses of ICT as part of that adoption pathway if we hope to truly comprehend the cultural and economic changes associated with technology.

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REFERENCES

- [1] Cassell J. and H. Jenkins (eds.), (1998). *From Barbie to Mortal Kombat: Gender and Computer Games*, Cambridge: The MIT Press.
- [2] Castells, M (1996). *The Rise of the Network Society, The Information Age: Economy, Society and Culture Vol. I*. Blackwell: Cambridge, MA.
- [3] Castells, Manuel (1997). *The Power of Identity, The Information Age: Economy, Society and Culture* Blackwell: Cambridge, MA
- [4] Colle, R. (2005). Memo to Telecenter Planners. *Electronic Journal of Information Systems in Developing Countries*, 21(1), 1-13.
- [5] Dagon, A. G. (2001). Prometheus Riding a Cadillac? Telecentres as the promised flame of knowledge. *Journal of Development Communication: Special Issue on Telecentres* 12(2).
- [6] Dubbels, B. (2003) Video Games as Metaphor for Learning and Curriculum Design
- [7] Egenfeldt-Nielsen, S. (2003). Review of the research on educational usage of games
- [8] Fuchs, R. (1998). *Little Engines that Did: Case Histories from the Global Telecentre Movement*. Ottawa: IDRC.
- [9] Garris, R., & Ahlers, R. (2003). Games, motivation, and learning: A research and practice model
- [10] Gee, J. P. (2003) *What video games have to teach us about learning and literacy*. Palgrave/Macmillan: New York, NY
- [11] Hudson, H. E. (2006). *From Rural Village to Global Village*. Mahwah, New Jersey: Lawrence Erlbaum Associates, Publishers.
- [12] Jensen, M., & Esterhuysen, A. (2001). *The Community Telecentre Cookbook For Africa - Recipes For Self-Sustainability*. Paris: United Nations Educational Scientific and Cultural Organization.
- [13] Khelladi, Y. (2001). *What Works: The Infocentros Telecenter Model*. Washington DC: The World Resources Institute.
- [14] Kolko, B.E. (2002). "International IT Implementation Projects: Policy and Cultural Considerations." *Proceedings from the Annual IEEE IPCC Conference*, Portland, OR, September 2002. 352-359.
- [15] Kolko, B.E., Thayer, A. (2003). "Games as Technological Entry Point: A Case Study of Uzbekistan." *Proceedings of the Digital Games Research Association*. Utrecht University. 19 pages.
- [16] Kolko, B.E (2006) "Cultural Considerations in Internet Policy and Design: A Case Study from Central Asia." *Critical Cyberculture Studies: Current Terrains, Future Directions*. Ed. David Silver and Adrienne Massanari. New York: NYU Press. 145-157.
- [17] Kolko, B.E., Rose, E.J., Johnson E. (2007). "Communication as Information-Seeking: The Case for Mobile Social Software for Developing Regions." *Proceedings of ACM World Wide Web Consortium Conference*. 863-872.
- [18] Mercer, C. (2006). Telecentres and transformations: Modernizing Tanzania through the Internet. *African Affairs*, 105(419), 243-264.
- [19] Poster, M. (1990). *The Mode of Information*. University of Chicago Press.
- [20] Proenza, F. J. (2001). Telecenter Sustainability - Myths and Opportunities. *Journal of Development Communications*, 12.
- [21] Proenza, F. J., Bastidas-Buch, R., & Montero, G. (2001). Telecenters for Socioeconomic and Rural Development in Latin America and the Caribbean. Washington DC: Inter-American Development Bank.
- [22] Schott, Gareth R. and Horrell, Kirsty R. (2000). "Girl Gamers and Their Relationship with the Gaming Culture," *Convergence*, v. 6, n.4, 36-53.
- [23] Taylor, T.L., Kolko, B.E. (2003). "Boundary Spaces: Majestic and the Uncertain Status of Knowledge, Community and Self in a Digital Age." *Information, Communication & Society*. 6:4, 497-522.
- [24] Yates, Simeon J. and Littleton, Karen. (1999). "Understanding Computer Game Cultures: A Situated Approach," *Information, Communication, & Society*, 2:4.
- [25] Williams, D., M. Consalvo, S. Caplan & N. Yee. (2009, in press). Looking for gender (LFG): Gender roles and behaviors among online gamers. *Journal of Communication*.
- [26] Williams, D., N. Yee & S. Caplan (2008). Who Plays, How Much, and Why? A Behavioral Player Census of Virtual World. *Journal of Computer Mediated Communication*.
- [27] Nardia Bianchi-Berthouze, Whan Woong Kim, Patel Darshak, "Does body movement engage you more in digital game play? And Why?", *Proceedings of the Int. Conf. of Affective Computing and Intelligent Interaction*, LNCS 4738, 102-113, Lisboa (Portugal), September 2007
- [28] Stevens, R., Satwicz, T., & McCarthy, L. (2007). In-Game, In-Room, In-World: Reconnecting Video Game Play to the Rest of Kids' Lives. In Katie Salen (Ed.), *The Ecology of Games: Connecting Youth, Games, and Learning* (pp. 41 - 66). Cambridge: The MIT Press.
- [29] Nardi, B. and Harris, J. (2006). Strangers and friends: collaborative play in World of Warcraft. In *CSCW '06: Proceedings of the 2006 20th anniversary conference on Computer supported cooperative work*, pages 149-158, New York, NY, USA. ACM Press.
- [30] Holland, W., Jenkins, H. & Squire, K. *Theory by Design* (2003). In Perron, B., and Wolf, M. (Eds). *Video game theory reader*. (pp. 25-46). London: Routledge.
- [31] Sandvig, C. (2006). The Internet at Play: Child Users of Public Internet Connections. *Journal of Computer-Mediated Communication*, 11 (4).
- [32] Wise, John MacGregor. (1997). *Exploring Technology and Social Space*. Thousand Oaks, CA: Sage.
- [33] Lenhart, Amanda, Kahne, Midaugh, Ellen, Rankin Macgill, Alexandra; Evans, Chris; Vitak, Jessica. (2008). "Teens, Video Games and Civics: Teens' gaming experiences are diverse and include significant social interaction and civic engagement". Pew Internet and American Life report. September 16, 2008. Available at http://www.pewInternet.org/pdfs/PIP_Teens_Games_and_Civics_Report_FINAL.pdf
- [34] Lenhart, Amanda; Jones, Sydney; Rankin Macgill, Alexandra. (2008). "Adults and Video Games" Pew Internet and American Life Project

- Data Memo. December 7, 2008. Available at http://www.pewInternet.org/pdfs/PIP_Adult_gaming_memo.pdf.
- [35] Bruno Latour. (2005). *Reassembling the social: an introduction to Actor-network theory*, Oxford, New York: Oxford UP.
- [36] C. Shawn Green and Daphne Bavelier. (2003). "Action video game modifies visual selective attention." *Nature*. Vol 423. pp. 534-537.