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ICT as Material Culture in CALL

Abstract

Human and technology interactions are bilateral. A man makes use of the technology
available anytime, but the technology enhances human potential and creates opportunities
for further development in this area. This mutual influence is illustrated on the example of
the use of Information and Communication Technologies (ICT) in Language Learning and
Teaching (LL&T). Both historical perspectives on Computer-Assisted Language Learning
(CALL) and the contemporary practices depict interrelations between material artifacts and
their use for learning purposes in the multilingual reality of the Internet. The results of re-
search on teachers of foreign languages show that material culture gives grounds for social
and pedagogical practices, yet, human perceptions, opinions, and actions constitute the actual
use of it.

Keywords: Computer-Assisted Language Learning, material culture, language teachers, ICT

Introduction

Information and Communication Technologies shape many areas of social
life and culture. Almost all world languages can be represented on the Internet.
UNICODE standard ensures encoding and handling written texts in most of
the world's languages. It contains over 110,000 characters used in writing
systems of various languages covering 100 scripts. But still some languages
are not present on the net, which is a side effect of digital divide. To prevent
it people need to have access to quality content at international, regional, and
local level in their native languages. However, depending on the demographic
data ten languages are used more often than others. Table 1 shows the number
of Internet users by language.

Table 1

Ten top languages used in the Web on 31st December 2013

Languages	Internet users % of world total	Internet users by language	World population for this language
English	28.6	800,625,314	1,370,977,116
Chinese	23.2	649,375,491	1,392,320,407
Spanish	7.9	222,406,379	439,320,916
Arabic	4.8	135,610,819	367,465,766
Portuguese	4.3	121,779,703	260,874,775
Japanese	3.9	109,626,672	127,103,388
Russian	3.1	87,476,747	142,470,272
German	2.9	81,139,942	94,652,582
French	2.8	78,891,813	377,424,669
Malay	2.7	75,459,025	284,105,671
TOP 10 LANGUAGES	84.3	2,362,391,905	4,856,715,562
Rest of the languages	15.7	440,087,029	2,325,143,057
WORLD TOTAL	100.0	2,802,478,934	7,181,858,619

Source: http://www.internetworldstats.com/stats7.htm

The proportion of Internet users does not reflect the amount of resources in the languages listed above. There are some methodological constraints in assessing the amount of resources in a language. The number of websites is constantly growing.[1] Search engines report the total of domains they are indexing; however, there are webpages that have not been indexed, multilingual websites, moreover, some non-native speakers write blogs or social networking posts in foreign languages they know. What is more, easy access to texts in various languages enhances multilingualism as learners of a language can easily find study materials on the Internet. In this way, ICT influence LL&T. But the increasing number of users of languages other than English illustrates the decreasing role of English as the main language of the net. The UNESCO report "Twelve Years of Measuring Linguistic Diversity in the Internet: Balance and Perspectives," written by Daniel Pimienta, Daniel Prado, and Álvaro Blanco, showed that English was not the dominant language on the Web in 2009. The use of English dropped from 80% in 1996 to 45% in 2008 (Pimienta, 2009).

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[1] According to Internet Live Stats the number of webpages was 1,197,146,189 on May 25, 2017, at 4 p.m. and three minutes later it was 1,197,146,732. Source: http://www.internetlivestats.com/total-number-of-websites/.

However, when the users solve problems with script at the level of a keyboard, CALL techniques are the same for any language. The history of Computer-Assisted Language Learning shows how language teachers and software developers have made attempts to adopt existing technology to the needs of language learners. Although ICT has not been invented and developed for language learning, operational functionalities of the software and hardware gradually change LL&T practice enhancing language acquisition, language skills training, and intercultural communication in the multilingual world.

Material Artifacts in Human Perception

The perception of reality is the traditional domain of philosophical studies. Heidegger (1927) in his early work emphasizes the role of the objects as tools. Later Heidegger (1949) raises the importance of the influence of objects on the human. New technology has to be adopted by the individuals and the society. Moore (1991/1999) identifies technology adoption lifecycles in five segments: innovators, early adopters, early majority, late majority, and laggards. Innovators are the pioneers, early adopters are visionaries who love working with technology, early majority are people who would use the technology to solve their problems on condition that they see it is successful for others they know, late majority are similar to early majority but less confident with the technology, laggards will wait until the moment they have no other choice. Nowadays, the telephone seems to be fully adopted by laggards. In the case of language teachers the readiness to use ICT depends on the level of their own individual and institutional experience. Bax (2003, p. 24) presents the stages of normalization, which can also be perceived as interactions between a human and machines in social and educational contexts.

1. *Early adopters*. A few teachers and schools adopt the technology out of curiosity.
2. *Ignorance/scepticism*. However, most people are sceptical or ignorant of its existence.
3. *Try once*. People try out but reject it because of early problems. They can't see its value – it doesn't appear to add anything of 'relative advantage.'
4. *Try again*. Someone tells them it really works. They try again. They see it does in fact have relative advantage.
5. *Fear/awe*. More people start to use it, but still there is (a) fear, alternating with (b) exaggerated expectations.
6. *Normalization*. Gradually, it is seen as something normal.

Although the telephone as a material artifact has been finally adopted, ICT is still far from normalization. What is more, according to Eurobarometer 340 (2010) only 17% of Polish people want to employ new scientific innovations and achievements in their life. Thus, the social context for implementing ICT-based material culture is not favorable.

Information and Communication Technologies as Artifacts

Material culture related to ICT includes hardware and specialized digital devices. However, as none of the devices could operate without software, it also has to be included as part of material culture.

Hardware and Peripherals

The main part of a personal standalone computer is a central station with a separate screen, mouse, joystick, keyboard, printer, scanner. Small memory storage devices always belong to the hardware as each type needs special reading devices. At the beginning, programs were stored on flexible 5.25 inch diskettes which were replaced by 3.5 inch disks and then by pendrives also called USB sticks. Terabytes external storage devices are also connected to the computer via USB. The movable storage in laptops and notebooks is integrated into one piece of equipment. Nowadays, hardware has become so small to be installed in a device whose primary affordance is a phone or a tablet. However, the use of mobile phones, tablets, laptops, and standalone computers differs, depending on the needs of users.

To build a computer network, other material hardware and software are used, such as routers, optical fibers, net protocols, etc. However, the end users do not need to be aware of the detailed structure of internal nets unless they serve their purpose.

Software

Computer programs, which make hardware operational and provide users with interfaces, can also be treated as artifacts. Hardware and software are designed to be easily operated by the users. Thus, user-friendliness and functionality of ICT are the main concerns of interface designers. The common area of interests shared by language teachers and learners, and software

engineers—designers of interfaces has led to the practical concept of participatory design (PD). The end users are involved as full participants in the design and evaluation of hardware, software, and computer-based activities (Muller, 1992). This collaborative and iterative process focuses on quality improvements (Bloomberg & Henderson, 1990). According to Colpaert (2004), students occupy different roles such as being a software user, language learner, communicator, and contributor to the design process. Thus, participatory approaches emphasize mutuality and reciprocity in shaping material artifacts to enhance and facilitate learning. In their case study, Cárdenas-Claros and Gruba (2010) specify the role of students in developing help options in computer-based listening activities.

Digital Products

A separate category of ICT material artifacts is created by digital devices dedicated to specific functions only, for example, educational toys, e-book readers, digital cameras, robots, game players. However, the tendency to integrate various functions leads to mobile devices such as mobile phones, smartphones, and tablets which offer comfortable access to some resources and encourage various types of users' activities. The users become less and less aware of the in-built hardware and software.

Digital Culture Artifacts

This category consists of software which is more and more normalized. Hardware and software are perceived just as means of storage and access. Their social and cultural role surpasses their image as a technology artifact, for example: portals, websites, video, and audio editing programs, games, mobile applications, Web 2.0 services such as social media, blogs, wikis, etc.

Social and Cultural Role of Digital Artifacts

Tim Bernes-Lee perceives the Internet more as social creation and medium of social communication rather than as technological device. The medium shapes its users through the language, the interface, and strategies of usage. Tim Bernes-Lee said: "It was really hard explaining the Web before people just got used to it because they didn't even have words like click, and jump, and page." Whatever the design of digital interface is, humans need to adopt their

operational strategies as well as their cognitive strategies to be able to use the tools for their purposes. Thus, computer users constantly develop computational thinking which enables them to solve problems with the use of computers effectively. A human needs to be able to define a problem in a way which can be dealt and managed with ICT. This requires a certain level of understanding as to what can be done with ICT and how. It also requires reasonable estimation of ICT limits. Dede (1995, para 4) notices the influence of medium-related objects on their users. "The telephone creates conversationalists; the book develops imaginers who can conjure a rich mental image from sparse symbols on a printed page. Much of television programming induces passive observers. Today's "couch potatoes," vicariously living in the fantasy world of television, could become tomorrow's "couch funguses," immersed as protagonists in 3D soap operas while the real world deteriorates." ICT creates gamers, blog exhibitionists, forum debaters, haters, etc. or learners of whatever they want, for example, languages.

Historical Perspective on Technology Change Influences on CALL

Computers were not developed for teaching and learning languages. Their first aim was rooted in mathematics to facilitate calculations. Similarly, the origin of script was also grounded in mathematics and trade. Thus, the educational use of digital devices in LL&T is an extra affordance. ICT is primarily aimed at business and military developments, its educational use is secondary, so almost all new digital artifacts need to be adopted to educational purposes.

The history of CALL provides insights into the processes of adopting existing material artifacts to the needs of language learners and teachers. It shows how individuals, institutions, and even educational systems adopt material culture. But first approaches to the use of computers in LT and LL surprisingly appeared, when computers operated on thousands of bulbs were only under control of IT specialists, the machines did not have any user-friendly features. Carton cards were used to input a code of the computer program into the computer. Strips of pinched paper carried the output of computer operations. It is hardly to imagine that the first idea of the use of computers for language learning appeared in the 1950s, when the mainframe computers looked like very big wardrobes, with no screens, no keyboards, no mouse devices, and no Windows. The use of video discs to provide learners with audio and video materials was not user-friendly. Taylor (1980) introduced the idea of a computer in LL as a tutor, tutee, and tool. In the role of a tutor, through computer-assisted

instruction the computer teaches the child, as a tool, the computer amplifies ability to address academic tasks, and as a tutee, it helps students learn by programming (tutoring) the computer. Later the role of a toy was added to emphasize learning while playing.

The next step in ICT material development was introduced with PC's (Personal Computers) in the 1980s. Windows provided space for graphics and interactivity. Language learning interactive software with texts, video, and audio materials was stored on CDs and used on standalone computers. However, the CDs were replaced in the 1990s by Internet resources.

Gradual progress in building either wire or wireless Internet connection has added communication functionalities, which opens interests in intercultural communication between learners of languages and starts all Web 2.0 based learning activities. ICT has become a means of either teacher-initiated and supervised or independent communication between learners. eTwinning program launched in 2004 allows for organized institutional cooperation between schools in different countries in which ICT is a means of communication. *Cultura Exchanges Site*, at Massachusetts Institute of Technology, provides framework for tandem academic intercultural cooperation for language learners. Other Internet initiatives, such as *LiveMocha*, gather independent learners who support each other in language learning. International project partners become resources of cultural knowledge. What is more, intercultural competence can be trained in practice via digital artifacts. Parallel to the development of the net, audio, and video have been more and more accessible and user-friendly.

The next step introduced mobility of the hardware when laptops connected to the Internet with an LCD screen, an in-built keyboard, and a touchpad instead of a mouse were launched. Then, the computer hardware reached the size of a telephone or a tablet and the era of Mobile-Assisted Language Learning has started.

Interactive whiteboards (IB) have become the most popular display devices used in education, which also allow for interaction with software or other users. As material artifacts IB operate linked to a computer and a beamer. Internet connection is a must to exploit them to their full potential. Cutrim Schmid and Whyte (2014) explore both the theoretical underpinnings of the use of this artifact and practical implementation of it in LL&T and in teacher training showing the educational potential of the interactive whiteboard. This example illustrates how the material culture (in fact one piece of it) fosters development in pedagogy and methodology of teaching languages.

Clickers were remote control devices for voting. In the classroom they are used for checking students answers in closed questions and giving short answers. Their main pedagogical role is to engage students into class activities and transform students learning (Beatty, 2004).

Technologies of the Future

The latest technology as material artifacts opens new areas of language learning pedagogy. For example robots can be used as teacher assistants in class or learner assistants for senior learners (Wen-chi et al., 2015). The use of mobile devices opens various dimensions of learning mobility: (1) mobility in physical space; (2) mobility of technology; (3) mobility in conceptual space; (4) mobility in social space; and (5) learning dispersed over time; with context being the "overarching term to cover interrelated aspects of mobility" (such as mobility in space, time, technology, social mobility, dispersed learning (Kukulska-Hulme et al., 2011, p. 159).

Finally, three artifacts with the potential in LL&T are worth mentioning as technologies of the future. (1) Google glasses provide text translation of what the person next to you is saying. (2) QR codes as means of giving instructions to students and directing them to materials may facilitate classroom learning and teaching. (3) Digital textbooks are being adopted by educational systems in many countries. All of them may also introduce changes in methodology and teaching strategies in CALL.

The Need for Learner Preparation for CALL

The need for teacher training for CALL has been well established and researched since the very beginning of the use of computers in LL&T and increased with the advent of online LL (Berge, 1995; Harasim, 1990). Any change in material culture has encouraged interest in teacher training. The research includes, for example, teacher training for online learning environments (Ernest et al., 2013; Guichon, 2009; Hampel & Stickler, 2005; Wang et al., 2010), design and evaluation of the best ways of training online language teachers (Comas-Quinn 2011; Ernest et al., 2012; Stickler et al., 2010), the use of multimodal audio-graphic online environments has received specific attention (Hampel & Stickler, 2012). For years teachers have relied implicitly on Prensky's idea (2001) of "digital natives" which assumes that learners of young age are computer literate and possess all competences and skills to be able to learn effectively with and through technology that is available for them. Investigation of online communication between language learners leads to more focus on learner training for the use of technology in LL. But learners can use ICT in the classroom encouraged by their teachers or independently in informal settings. Even digital natives are not able to use online tools proficiently and to their best advantage for the purpose of learning (Jeffrey et al., 2011; Thorne, 2003). They need training focused on both selection of digital artifacts effective in their learning context and ICT-based learning strategies. Some research

has pointed out the negative impact of technology on student learning (Conole, 2008; Ushioda, 2005). Technologies "can only be effective if they are in the hands of students who know what to do with them" (Figura & Jarvis, 2007, p. 457) and that effective use of technologies requires learners to possess certain skills, strategies, and attitudes (Hubbard, 2004). The research presented above illustrates how the technology as material culture requires further developments in training strategies not only for teachers but also for learners, how it shapes its users: learners, teachers, and researchers while they enter the multilingual digital world.

Feminist Angle

Half of the language learners are women. Three fourths or more teachers of languages are women, depending on the country, for example, in Poland 90% of language teachers are women. Thus, feminist perspective on ICT as material artifacts gives an additional insight into the topic. As ICT is perceived as a male domain in Europe and America, females tend to diminish their computer competence and refrain from developing ICT skills (Gajek, p. 2012). Women need stable, easy, and user-friendly digital tools. An example of such artifact is email, skype, and the majority of social media. The need for stability enhances the trend towards normalization defined by Bax (2003). Once learned how to operate it, the tool becomes invisible, it is used for work, communication, cooperation, and cultural or artistic purposes. Interface updates are nightmares for female ICT users.

Methodology

The aim of the research was to find interrelation between teachers of languages access to digital devices, their opinions and perceptions on the usefulness of ICT in language learning and teaching and actual use of digital materials in their teaching practice and for private purposes. The total number of 671 teachers of languages participated in the study from March to April 2013. The respondents answered questions distributed through the Foundation for the Development of the Polish Educational System newsletter.

Results

The results indicate the importance of the feminist angle as 90.3% of the respondents were women and 9.7% were men. Eighty point nine percent were

aged between 25 and 45. Seventy-three point three percent were teachers of English, 20.1% were teachers of German, 7.5% were teachers of Russian, and 4.8% were teachers of French. Seven point two percent were qualified as teachers of two languages. As the survey was distributed online, all respondents had access to hardware and software required. Seventy-one point eight percent had an access to a standalone computer, 86.3% to a laptop, and 52.5% to both of them, 21.0% to a notebook, and 58.3% to an interactive whiteboard.

The teachers use ICT for: writing texts (95.38%), for emails (98.36%), for contacts through social media (66.02%), making films (36.81%), and taking photos (80.18%). They also use digital media for reading and listening in the language they teach 86.74%. Thus, they are active and experienced computer users of digital resources.

The teachers have a positive attitude towards the use of digital resources and tools in class. Eighty-nine point eight percent of the respondents agree with the statement that "languages should be taught in communication with other learners abroad—also via ICT." What is more, 96.6% agree that "communication with foreign partners motivates learners to learning languages." Ninety-two point fifty-four percent of them encourage learners to read and listen to digital texts in the language they learn, while 87.3% agree that digital films and audio materials are necessary for learning foreign languages. Seventy-six percent disagree with the statement that while teaching reading and listening the teachers should not use digital devices, whereas 89.37% disagree that the use of computers in language class is a waste of time. Seventy-nine point seven percent of the respondents are not afraid that pupils damage digital equipment during their lessons. As many as 81.34% also disagree that students are not competent enough to use computers for language learning.

In terms of the teachers' competences 63.28% declare to know how to use an interactive whiteboard, 62.54% are able to show learners how to use mobile devices for language learning while 60.6% know how to use them in class.

However, they do not often use digital resources in class. At least every week 39.8% use dictionaries, 33.4% let pupils do tasks on an interactive whiteboard, while 25.2% use digital games. What is more, games are used mainly at primary level. Only 39.5% of the respondents actively participated in international projects either eTwinning or Comenius, which nowadays are components of Erasmus+.

In the open question teachers who do not use computers in class complain about the limited access to hardware, either to computers or to an interactive whiteboard, 36.7% do not have access to the school computer lab because of the IT lessons which take place there. Some voices emphasize the role of teacher's motivation to the use of ICT in LL&T.

Discussion

The analysis and results show that digital materiality is the key factor in introducing and effective using of ICT in LL&T. What is more, even if the language teachers are competent users of ICT and their professional and private attitude towards technology is positive, the actual use of ICT is not as intensive as the factors might indicate. There must be other reasons for increasing the impact of ICT on LL&T. Digital materials give the ground on which social and pedagogical practices are built. Buckland (2000) indicates the role of school's policy with clear managerial and organizational regulations reflecting national curriculum, local human resources—their preferences and responsibilities, systems and procedures including channels of communication, assessment of learners and teachers as well as staff development opportunities.

Conclusions

The use of material artifacts and their successful integration into a classroom depends on many kinds of social practices built on the materiality, for example, the design of activities based on pedagogical priorities (Richards, 2005). To avoid using technology for the sake of technology, instructors have to implement it on the basis of sound pedagogy and theoretical perspectives (Karabulut et al., 2012) and provide learners with information about the technology which enhances language learning in informal settings outside the classroom.

On the one hand, the analysis presents the need for conceptual and critical methodology reflection at every stage of development of technology. On the other hand, it shows the need for human flexibility in the technology adoption for pedagogical purposes in the multilingual world. In the case of less widely spoken languages the creation of digital resources in both international and local languages is equally important. ICT's material artifacts used in the language classroom encourage rethinking LL&T practice within a holistic ecological approach (Hoven & Palalas, 2011). Further development of effective learning procedures can only take place through the hands-on approach and experience shared among all stakeholders, that is, learners, teachers, educational managers and leaders, software engineers and educational researchers considering all voices from various contexts.

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Zusammenfassung

Die Wechselbeziehung zwischen Menschen und Technik ist zweibahnig. Der Mensch macht sich die Technik zunutze, aber auch die Technik verbessert die Leistungsfähigkeit des Menschen und schafft Bedingungen für Weiterentwicklung des Technikeinsatzes. Diese bilaterale Abhängigkeit wird hier am Beispiel von Anwendung der Kommunikativen und Informationstechnologien (TIK) im Fremdsprachenlehren und -lernen expliziert. Sowohl der historisch betrachtete computergestützte Fremdsprachenunterricht als auch heutige didaktische Methoden veranschaulichen die Wechselbeziehung zwischen materiellen Objekten und deren Ausnutzung beim Lernen im mehrsprachigen Internetmilieu. Die Lehrer können immer sachkundiger, TIK im Lehr- und Lernprozess anwenden. Die Schüler dagegen brauchen die Strategien des erfolgreichen Unterrichts mittels der digitalen Lehrmittel kennenlernen. Die von den Fremdsprachenlehrern durchgeführten Forschungen zeigen, dass obwohl materielle Kultur die Grundlage der sozialen und pädagogischen Handlungen bildet, sind Ansichten, Meinungen und konkrete Maßnahmen derjenige Faktor, der für die Anwendung der materiellen Kultur beim erfolgreichen Fremdsprachenunterricht entscheidend ist.