Computer-Assisted Instruction in Higher Education in Russia:  
Exploring the Factors that Relate to Technology Integration

Research Proposal

ERDG 779

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Introduction

The growing social role of information in modern society assigns new goals and tasks to the system of education, placing new duties on teachers, students and their parents. With the dynamic development of information technologies and global digitalization of information, it is becoming especially important to utilize technologies as teaching and learning tools. Effective utilization of instructional technologies has been linked to increased student motivation, equalization of minorities, better participation patterns, and higher quality of linguistic production (Kern, 1995; Warschauer, 1997, etc.). A great deal of research supports the view that technology integration enables teachers to create a student-centered learning environment conducive to critical thinking, active learning, and co-construction of knowledge, which is aligned with constructivist approaches to learning/teaching (Gallini & Barron, 2001-2002; Weasenforth et al., 2002; etc.). Finally, modern networked technologies destroyed geographical borders providing access to quality education to larger numbers of people who would otherwise not be able to join the world learning community (Johnson, 2003).

Research, however, indicates that the very fact of installing fancy equipment in schools and universities does not automatically result in its effective usage (Robler, 1999; Smith, 2000; Snider, 2002). The factors that impede or support the adoption of instructional technologies could be of two kinds: general for any educational institution in any country (for example, access to computers) or context-specific, particularly culture-specific. Therefore, studies examining the whys and hows of technology integration in different countries may lead to interesting findings and help to speed up the process of technology adoption through policies and initiatives that address culturally specific needs.
The purpose of the research proposed is to study how the usage of computer technologies in teaching is related to factors such as age, gender, teaching discipline, computer expertise, and beliefs about the value of computer-assisted instruction (CAI). The study will examine the current status of CAI in one of the largest and oldest universities in Russia – Kazan State University. It is hypothesized that the listed factors are correlated.

In Russia, the importance of technology integration into the educational system is recognized on the federal level. In 1997 the Ministry of Education developed a unified conception of information technology integration into general and professional education (Obrazovanie, 1999). However, literature on the success of technology integration is scarce. The research related to integration of computer technologies in Russia is limited to reports describing individual instances of computer assisted instruction and attempts of the Russian government and individual educational institutions to provide students and instructors with computer access and basic training (Holdsworth, 1997; Kolobeshkin, 2002; Matveyev & Zhuravlyov, 1997). To my knowledge, there were no large-scale studies on a federal level that would involve faculty members and/or students as major stakeholders. What is going on at the local level also remains unknown. The proposed study is designed to partly address this information gap.

Technology Integration as Innovation: First Believing Then Adopting

Adoption of innovations is a complex and slow process that goes through several stages from early adoption by a small group of enthusiasts to inclusion of highly resistant groups (Rogers, 1995). Relevant literature indicates that technology integration, as any kind of innovation, does not happen at once and everywhere. Technophobic faculty members were not rare in the late 90’s. Novek (1999) reported that instructors feared that computer integration may
lead to the devaluation of the teaching profession. Teachers expressed concerns with the potential dehumanization and alienation effect of technology integration; they worried about the quality of student-teacher interaction. Distance learning was perceived by some respondents as a direct threat to instructors’ teaching positions. Novak (1999) called for the discussion of the “hidden costs of information technology” that teachers, students and the society in general may face.

It is obvious that if an innovation is not perceived to be of value but rather as a threat, it is resisted. Generally, however, technologies are resisted not because instructors feel threatened by their potential value that could devaluate the role of instructors, but because of disbelief in the necessity of such innovations. There exists a critical relationship between the stakeholders’ beliefs about the innovation and a decision about its adoption. Similarly, teachers’ disbelief in the instructional value of computer technologies inevitably results in low adoption rates and the literature unanimously agrees on that (Czerniak et al., 1999; Dusick, 1998; Ertmer, 2005; Bennett & Bennett, 2003; Sugar et al., 2004).

How are these beliefs/disbeliefs formed? Rokeach (1975) identified four characteristics of beliefs: they 1) are personal, 2) are individually derived, 3) form the basis for the individuals’ perspectives about right and wrong, and 4) predispose individuals to certain models of conduct. It is argued that beliefs are formed through the process of enculturation, social construction and also by chance, experience, and events (Pajares, 1992). Considering this, we can conclude that beliefs about instructional technologies are determined by internal personal characteristics of instructors and also by external environmental factors. Because these beliefs are towards specific type of innovation – technologies, they are first of all determined by the very characteristics of these technologies.
Characteristics of Instructional Technologies

Modern instructional technologies mainly encompass computer technologies that are used for instructional purposes. Though such technologies as tape- and video-recorders, along with simple overhead projectors are still used in some classrooms, the dramatic development of computer technologies has enabled instructors to utilize them as educational tools. Technologies and software are usually not created with an instructor/learner in mind, and therefore they should meet certain requirements to be used as instructional tools. Bennett and Bennett (2003) identified five characteristics of technology that may effect the faculty members’ likelihood of technology integration: 1) relative advantage of technology, i.e. instructors’ beliefs in the value of technology; 2) trialability, i.e. ability to test technology before integration; 3) observability, i.e. ease of observing potential advantages of technology; 4) complexity, i.e. ease of understanding how technology is applied; 5) compatibility, i.e. consistency of technology with instructor’s values and philosophy of teaching. These characteristics can be narrowed down to two basic questions that a faculty member may have: Why should I integrate technologies into classroom practices? and How should I do it? The first question refers back to the issue of the faculty beliefs in pedagogical advantages of instructional technology, while the second one addresses such issues as experience with technologies, training, release time for revising of materials and strategies, etc.

Do Instructors Believe in Pedagogical Value of Instructional Technology?

The review of articles published in the United States indicates that instructors generally perceive technologies as valuable educational tools. Czerniak et.al. (1999) examined the influence of K-12 teachers’ beliefs on their intent to integrate technology into their classrooms.
The responses of 204 teachers showed that most teachers do believe in the instructional value of technology integration, the main value being the realization of students’ needs. In another study, a survey of 97 teachers from 4 different schools revealed that overall teachers believe in the instructional value of technology though they see potential drawbacks of its use (Sugar et al., 2005). Preparing students for future careers, exposing students to variety of new technologies, holding students’ interest, and enabling students to gain additional skills were the most common advantages of technology. Conversely, the disadvantage of making students too dependent on technology was a commonly mentioned concern of teachers.

To develop the research instrument, both of these studies utilized the Theory of Planned Behavior (Fishbein & Ajzen, 1975; Ajzen & Madden, 1986), according to which one needs to consider three variables to predict intentions/behavior: attitude toward the behavior, subjective norm (support from others), and perceived behavioral control (environmental factors, resources). While Czerniak et.al. (1999) did not find that belief about the effectiveness of technology integration had a significant influence on teachers’ motivation to adopt technologies, the later study, conducted by Sugar et al. (2005), did find such a relationship. The contradictory findings reported in Czerniak et.al. (1999) and Sugar et al. (2005) could be attributed to historical changes that had happened since 1999. Given the speed of technology development and current general support for technology integration from authorities, contemporary teachers seem to receive adequate extrinsic motivation to technology adoption, but they may still lack intrinsic motivation to adopt innovations.

What factors determine intrinsic motivation to integrate instructional technology? What variables could be associated with an instructors’ belief in the pedagogical value of this educational tool? The literature suggests several reasons why instructors chose to work with
technology or preferred the ‘chalk-and-board’ approach. Most studies focus on demographic characteristics, field of study, and teaching philosophy.

**Do Demographic Characteristics Matter?**

Attitudes towards instructional technologies and the willingness to integrate them are generally linked to such characteristics as age and gender. Studies investigating this relationship do not give a conclusive answer to the question. Inoue (1999), as well as Sammons & Strickland (2000), did not find a statistically significant relationship between the perception of computer-assisted instruction (and thus readiness to integrate technology) and the gender and age of instructors. On the other hand, Kagima, L.K. & Hausafus, C.O. (2000) found that faculty computer self-efficacy scores were different for participants of different age and gender, with younger and/or male faculty members scoring higher than their older and/or female colleagues. A case study conducted by Hellsten (2006) revealed that Swedish female teachers found it more difficult than men to integrate information technology into their classrooms. The researcher came to the conclusion that IT is “strongly gendered” and has “male attributes”. Interviews carried on by Wang & Speaker (2002) also showed that age and gender of faculty members, along with other factors, have to be considered in the design of technology implementation. Age was also mentioned by Czerniak et.al. (1999) as a factor affecting the attitudes of teachers, parents, and taxpayers to technology adoption. Given the contradictory findings and the fact that age and gender characteristics could be mediated by culture, it seems reasonable to include these variables as possible factors that affect technology integration.
Does Subject Matter Influence Technology Integration?

The comparison of technology usage by faculty members teaching different disciplines show mixed results. In a large scale study of psychology faculty uses and attitudes towards computer-assisted instruction, Glasgow & Keim (2005) found that though 97% of part-time and full-time instructors have access to the computer, only 60% use computers for instructional purposes. When they compared their findings to the results of the similar study conducted by Patton in 2001, it was found that community college business instructors reported higher usage of computer-assisted instruction (CAI) and better attitudes to CAI. O’Quinn & Corry’s (2002) study also suggested that some classroom faculty may doubt that their academic discipline was conducive to distance education (for example, the teachers of drawing and design or ESL). Additionally, a study conducted in Singapore found no difference in computer usage between faculty members teaching education and business (Inoue, 1999). Such mixed results suggest that teaching discipline needs to be taken into account and that this variable could be culture-specific.

Teaching Philosophy as a Factor

Faculty members may find a discrepancy between their teaching philosophy and methods of teaching required in the technology-enhanced classroom. Instructional technologies are seen today as tools for constructivist teaching/learning based on the active involvement of the learner in knowledge construction. Learning is perceived not just as the act of individual cognition but rather as “an act of enculturation… in mediated social context” (Gallini & Barron, 2001-2002). Constructivism rejects the teacher-directed model of instruction and moves to learner-centered principles. A growing number of educators recognize that new communicational technologies can be used as tools for accomplishing new instructional objectives aligned with constructivist
principles. In practice, however, faculty may resist changes in pedagogy. Finley & Hartman’s (2004) interviewees expressed doubt that some of their colleagues may know student-centered activities that could be performed with technologies. Moreover, they believe that some faculty members may not wish to give control of the learning process to the student, that is, to adopt a more constructivist approach. Glasgow & Keim’s study (2005) found the lecture, oral discussion and chalkboard as the top three teaching strategies among psychology faculty, with computers rated only the seventh most prevalent teaching method.

Changing teachers’ fundamental beliefs “requires new ways of both seeing and doing things” (Ertmer, 2005, p.26), which is a riskier and more complex process. The U.S. Department of Education (ISET, 2003) has stated that even though 81% of American teachers have moderate to high levels of access to instructional computers, and that 85% of teachers reported feeling “somewhat well-prepared to use technologies, many of them still use computers only to perform low-level tasks (word processing, Internet research). This scenario is “far removed from best practices advocated in the literature”, and which usually doesn’t change teacher-centered practices (Ertmer, 2005, p.26). Furthermore, there are indications that technology, being a “constructivist-type” tool may have direct effect on teaching philosophy.

Such changes in teaching philosophy were found by Gallini & Barron (2001-2002). They surveyed teaching/learning perceptions of 10 instructors’ and 153 students’ in web-infused courses. Among other questions, the survey addressed the issues of pedagogical beliefs, teaching and learning approaches and instructional and learning strategies. They were particularly interested in exploring the idea that instructors who adopt communicational technologies may substantially revise their pedagogical approaches. It was found that 70% of faculty, who used the Internet as a communication tool and for web integrated activities, changed their pedagogical
approach from the traditional teacher-directed to the learner-centered approach. The researchers concluded that though Web technologies can influence teaching practices, sufficient time is needed before existing pedagogical frameworks are restructured.

*External Factors: Support and Resources*

The literature reviewed indicates that the extent and speed of technology integration is directly related to the external support that instructors get or do not get from administrators, colleagues, IT staff, policy makers, government and society in general. Based on the Theory of Planned Behavior, support from others (subjective norm) and availability of resources (behavior control) are the two factors that, along with attitude towards the behavior, predict a person’s intentions and actions. Czerniak et.al. (1999) found that most teachers believe that the society in general and stakeholders in particular (principals, students, parents) approve of technology integration, though some older teachers, parents, and taxpayers may not see the value of technology adoption. The study revealed that perceived behavior control and subjective norm were significantly linked to teachers’ intentions to adopt technology. Though in a later study Sugar et al. (2005) failed to provide statistical justification of such a relationship, qualitative studies that collect data from case studies, open-ended questionnaires, and interviews do show that such a relationship exist.

Finley & Hartman (2004) employed a case study approach and interviewed five faculty members from different departments with an intention to elicit perceived barriers to technology adaptation across three different dimensions: 1) discussions of visions of appropriate use and pedagogical issues, 2) knowledge and skills, and 3) departmental culture and leadership. The interviews showed that one of the potential barriers to technology integration is the “bells and
whistles” approach to technology integration. Faculty are more interested in how to better address pedagogical issues and not so concerned about finding better and fancier technology. Many of them do not see how to address both issues at the same time, that is, how to apply technology to specific content objectives. This suggests that the support faculty receive from IT staff and other stakeholders may not match the instructors’ vision of the role of technology in teaching and learning.

The existence of communication or miscommunication problems between major stakeholders is also reported in Strauss (2005). The author, an IT staff member from Princeton University, identified several reasons why so many faculty members do not use available technologies and IT services to enhance their teaching. Factors hindering technology adoption are: an ignorance of what is available and what technology can do; misconceptions about the level of difficulty; miscommunication with IT staff; disinterest in something that seems to be not relevant to short-term needs; and lastly, the lack of motivation and perceived inability to keep up with constantly changing complex technologies that are developed for IT professionals.

Understandably, computer expertise is commonly considered as a predictor of instructors’ beliefs about the value of instructional technology and the degree of technology adoption. In the study conducted in Singapore by Inoue (1999), among seven independent variables that were hypothesized to be related to faculty perception of computer-assisted instruction (gender, age, teaching discipline (education or business), knowledge of CAI, teaching experience, user/non-user of CAI) only the knowledge of CAI was found to be significantly related to perceived usefulness of CAI. Kagima & Hausafus (2000), who investigated the contributions of faculty computer self-efficacy into the integration of electronic communication in higher education, also reported direct relationship between the use of computer technologies
and their instructional application. The success of faculty training reported by Bennett & Bennett (2003) also justifies the importance of computer expertise for technology integration.

Common external factors such as lack of resources, funding, release time, and salary increase were mentioned in Czerniak et.al. (1999), Finley & Hartman (2004), O’Quinn & Corry (2002), Strauss (2005), Sugar et al.(2005).

The integration process of instructional technology could be slowed down by a number of factors as it involves many stakeholders and impacts numerous areas of the complex educational system. Integration of technology is a complex process that requires changes in teachers’ beliefs and traditional practices. These changes can be implemented only if teachers believe in the necessity of such transformation. The factors that trigger changes could be internal or external. The internal factors include teachers’ personal beliefs in effectiveness and necessity of technology integration, while the external factors include social support and environmental characteristics (resources). These factors could be affected by such individual characteristics as age, gender, subject taught, and computer expertise (computer self-efficacy). The literature review does not show consistency in the findings, and this suggests the need for further investigation of the problem. The importance of the issue and the lack of studies on technology integration in Russian higher education highlights the significance of the proposed research. It is my hope that the findings may inform Russian policy makers and professional development staff whose efforts must help faculty members to find the whys and hows of adopting instructional technology.
Methodology

Participants

The sample group for this study will be selected from all the faculty members of Kazan State University, Russia. The population will be stratified into two groups: faculty members of academic schools specialized in hard sciences (math, physics, computer science, etc.) and social sciences (philology, history, sociology, etc.). Three schools from each strata will be selected. Due to the novelty of such survey research to Russian faculty, the researcher will contact chairs of the departments and will negotiate the possibility to visit faculty meetings in order to ensure high participation rate. At the end of faculty meetings, the researcher will describe her study and invite all people attending the meeting to complete the survey. Faculty members will also be invited for tea and a cake to compensate for their time. Efforts will be made to ensure return of not less than 200 completed surveys.

Research Design

The proposed study will have a correlational research design. The variables under consideration are: 1) age with five levels – 21-30, 31-40, 41-50, 50-60, >60; 2) sense of efficacy with computers with five levels (measured on five-point Likert-type scale with 1 = strongly disagree and 5 = strongly agree); 3) perceived usefulness of computers as instructional tools with five levels (measured on five-point Likert-type scale with 1 = strongly disagree and 5 = strongly agree), 4) degree of computer integration with five levels, measured on five-point Likert-type scale with 1 = never and 5 = almost always. Two categorical variables – gender (male/female) and discipline (hard science / social science) will also be considered.
**Instrumentation**

The data will be obtained by means of a survey. The survey will include 1) demographic data – age and gender, 2) a question about academic discipline taught, 3) questions related to the sense of efficacy with computers and other instructional technologies, 4) questions related to perceived usefulness of technology as instructional tools, 5) questions related to the degree of technology integration.

To measure the sense of efficacy with computers/technology the instrument developed by Bennett & Bennett (2003) will be modified and used. Inter-item reliability for both scales were reported to be good (coefficient α=.83). To assess the perceived usefulness of computers as instructional tools, an instrument developed by Metu (1994) will be significantly modified and used. To assess the degree of technology integration, the instrument developed by Brown et al. (2001) will be modified and implemented. Because Metu (1994) and Brown et al (2001) did not reported reliability results, internal-consistency method (split-half procedure) will be utilized. The validity of the developed survey will be based on 1) validity of the tested and published instruments, 2) content-related evidences confirmed by expert judgment. The survey is presented in the Appendix.

**Procedures**

At the beginning of the Fall-2006 semester the researcher will contact the department chairs of 6 selected schools of Kazan State University and agree to attend faculty meetings. All faculty present at the faculty meeting will be invited to participate in the study. Tea and a cake will be provided while faculty members complete the survey. The order of data collection will be aligned with scheduled faculty meetings.
The following threats to internal validity are predicted: 1) subject characteristics (those who will agree to complete the data could be different from those who won’t), 2) attitudes of the subject (participants may want to look more up-to-date with technologies), 3) location (different locations of faculty meetings, possible exchange of information among faculty members), 4) history (unplanned events before or during completing the survey). To address these threats, the researcher will inform that the survey will be anonymous, will ask participants not to discuss the responses and will try to avoid any disruptive events.

Kazan State University as one of the top 10 universities in Russia and mostly funded by federal government. Therefore the generalizability of the results will be limited to faculty members of large comprehensive universities in Russia with similar academic status and material base.

The analysis of the data will include descriptive statistics, analysis of correlation (correlation coefficient matrix), ANOVA for analyzing differences between genders and disciplines, and effect size.
References


http://chronicle.com/weekly/v51/i42/42b03001.htm


Appendix

Survey

The following survey is a part of the study researching instructional technology usage among faculty members of Kazan State University. We would appreciate if you could answer the questions below. Your answers are totally anonymous.

Please choose the best answer to the following questions.

**Part I.**

1. What is your department? __________________

2. What is your general field of teaching and research? __________________

3. How old are you? 30 or younger 31-40 41-50 51-60 61 or older

4. What is your gender? Male Female

**Part II**

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<thead>
<tr>
<th></th>
<th>Strongly Agree</th>
<th>Agree</th>
<th>No Opinion</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
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<tbody>
<tr>
<td>1. Figuring out a computer problem does not appeal to me</td>
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<td>2. Computers frustrate me</td>
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<td>3. I have a lot of self-confidence when it comes to working with computers.</td>
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<td>4. I feel apprehensive about using a computer</td>
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<td>5. I have become familiar with computers through my previous experience.</td>
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<td>6. I feel qualified to teach computer literacy.</td>
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<td>7. I feel at ease when I am around computers.</td>
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<td>8. Learning to operate computers is like learning any new skill—the more you practice, the better you become.</td>
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<td>9. I do not think that I could handle a computer course</td>
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<td>10. Computers are hard to figure out how to use</td>
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1 Bennett & Bennett (2003)
Part III\textsuperscript{2}.

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<tr>
<th></th>
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<th>Strongly Agree</th>
<th>Agree</th>
<th>No Opinion</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
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<tbody>
<tr>
<td>1</td>
<td>The use of computers can improve quality of classroom instruction</td>
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<td>2</td>
<td>Learning is easier and faster with computers</td>
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<td>3</td>
<td>I would like to use a computer in my classroom</td>
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<td>4</td>
<td>I would like to learn how to use computers for teaching</td>
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<td>5</td>
<td>Computers can make a difference in the way students learn</td>
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<td>6</td>
<td>Computers can make teaching easier for me</td>
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<td>7</td>
<td>Computers can make learning easier for my students</td>
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<td>8</td>
<td>My students will not benefit if I learn how to use computers for teaching</td>
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<td>9</td>
<td>Using computers for teaching is a waste of classroom time</td>
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<td>10</td>
<td>Learning how to use computers for teaching is a waste of time and money</td>
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<td>11</td>
<td>Computer skills are not necessary for university professors</td>
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<td>12</td>
<td>I respect colleagues who use computers for teaching</td>
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\textsuperscript{2} Adapted from Metu (1994).
Part IV\(^3\).

How often do you utilize the following computer applications for teaching?

<table>
<thead>
<tr>
<th>Application</th>
<th>Never</th>
<th>From time to time</th>
<th>Sometimes</th>
<th>Often</th>
<th>Almost always</th>
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<tr>
<td>Word processing</td>
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<td>Draw/paint software</td>
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<td>Presentation software</td>
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<td>WWW-publishing (web-page)</td>
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<td>WWW-research</td>
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<td>Subject-specific software</td>
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<td>Audio-/video-software</td>
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<td>Email/chats</td>
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<td>Software for oral communication</td>
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<td>Spreadsheet</td>
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<td>Databases</td>
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<td>Other (please explain)</td>
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THANK YOU!

\(^3\) Adapted from Brown et al. (2001)