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## From idol to add-on to indispensable tool : Iowa's one-computer classroom

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## From idol to add-on to indispensable tool : Iowa's one-computer classroom

### Abstract

Teachers who ponder over past experiences can examine the revisions made in order to offer the best possible education to the children entrusted to their care. With the advent of computers in the classrooms, undeniable problems arise and further revisions must be made. When both the teacher and students share one computer, issues that must be addressed include time management, curriculum integration, and effective use of the computer.

With everyday demands of the classroom, it is difficult for teachers to spend time adding to a curriculum already filled to the brim. Time is needed for the teacher to understand how the computer will fit into their needs and not become just an add-on. This process should go from simple in the beginning to more complex as they become more familiar with the computer as a tool.

Teachers and students can utilize the computer to serve four major functions: organizing, communicating, producing and presenting materials, and modeling effective uses for students, teachers, and parents.

From Idol to Add-on to Indispensable Tool  
Iowa's One-computer Classroom

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Submitted to the

Division of Educational Technology

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By

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## Abstract

Teachers, who ponder over past experiences, can examine the revisions made in order to offer the best possible education to the children entrusted to their care. With the advent of computers in the classrooms, undeniable problems arise and further revisions must be made. In a classroom where both the teacher and students share one computer, issues that must be addressed include time management, curriculum integration, and effective use of the computer.

With everyday demands of the classroom, it is difficult for teachers to spend time adding to a curriculum already filled to the brim. Before a teacher will attempt to include the computer as an integral component of the classroom, time is needed for the teacher to understand how the computer will fit into their needs and not become just an add-on. This process should go from simple in the beginning to more complex as they become more familiar with the computer as a tool.

Teachers and students can utilize the computer to obtain four major functions: organizing, communicating, producing and presenting materials, and modeling effective uses for students, teachers, and parents.

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## Introduction

As if an idol, it may stand propped in a corner, on a teacher's desk, or perhaps covered under a protective blanket of plastic. Occasionally the teacher offers this idol a floppy disc or CD-ROM to appease any onlookers that it has found a niche in the classroom. This does not give it status of being a vital instrument of education. Schools have placed considerable emphasis on installing and using this golden calf in the classroom, however time has not been allotted to why, when, and how to integrate the computer into the curriculum.

A classroom computer functioning as a curriculum add-on is not an efficient and effective use of this tool. Time is needed to aid teachers in addressing issues on understanding the computer and its uses in the classroom (Dockertman, 1991). Some of the issues pertain to the haves and have-nots, controversy over when to introduce the use of computers, concentrating on the subject matter or the student, uncovering intrinsic motivation or giving way to extrinsic motivation, focusing on process or product, and fostering cooperation or competition. A more applicable approach asks questions encompassing the education of the students as a whole process. What do the students need to know? What is the environment of the classroom? What resources are available? The computer is one resource with powerful potential to play an important role in the classroom. The teacher must consider this role, as well as the roles teachers must employ.

There are three dominant roles for the teacher to play in the classroom: choosing material; introducing material; and evaluating what the students learn about the

material (Newby, Stepick, Lehman, Russell, 1996). Varied knowledge, experiences, and teaching strategies help shape how the individual teacher plays these roles while the computer can assist with the management of these roles. When the computer becomes a tool used by students, the teacher's role can expand to include model, facilitator, encourager, director, guide, and team leader. Student to computer ratios in schools affects these roles, along with other pedagogical choices made by the teacher.

In the United States the student to computer ratio varies among schools. Experts consider a ratio of four to five students per computer to be ideal (President's Committee of Advisors on Science and Technology, 1997). In the state of Iowa, the ratio of students per instructional computer is 4.7 percent, a computer which includes a sound card and CD-ROM is 8.5 percent, and access to a computer connected to the Internet a percentage of 9.6 students per computer (Editorial Projects in Education, 1999). Many schools set up computer labs utilizing schedules. This approach can make it more difficult for the computers to function as an integral component in the classroom. According to the President's report, around half of all teachers have one computer in the classroom and usually no more than two computers (President's Committee of Advisors on Science and Technology, 1997). The challenge comes in these schools to discover ways to use that one computer in the classroom as an indispensable tool for both teacher and student.

### Methodology

Faced with a one-computer classroom situation can appear to be a hurdle. Locating and reading the President's report (President's Committee of Advisors on Science and



Technology, 1997) off the Internet indicates many teachers face this same hurdle. A further search produces computer data specifically for the state of Iowa, confirming the student to computer ratio and the setting up of computer labs to accommodate the lack of computers.

Grumbling about the small number of computers within a school system is idle conversation. Seeking out teachers who have developed a learning environment that incorporates the single computer as an invaluable tool can help others design a similar workable plan. The Internet offers web pages developed by some of these teachers along with educational sites to exchange ideas, ask questions, and guide teachers to solve the dilemma of integrating one-computer into their classroom.

Spending time in a university's curriculum lab uncovers books that can guide the teacher when integrating the computer into the classroom. The two books, Instructional Technology for Teaching and Learning (Newby, Stepick, Lehman, Russell, 1996) and The Teacher-friendly Computer Book (Suid, 1984), both treat the computer as a tool with clear-cut examples to consider using or adapting to individual needs.

A book search on computers in education covers topics, which include constructivism, student-centered classrooms, web-based projects, and how teachers are integrating technology into their curriculum. Focusing on the one-computer classroom vastly limits the amount of material available. The book Great Teaching in the One Computer Classroom (Dockterman, 1991) is an excellent source with a variety of ideas on effective uses for the one-computer classroom.

The book HyperStudio for Terrified Teachers (Fleck, 1997) was also located in a curriculum lab. This book guides and supports a teacher with the integration of the software into the curriculum.

Going back to the Internet and taking time to view educational sources a teacher will find on-line projects that can be used with one computer in the classroom. A WebQuest (Dodge, 1999) is an interactive activity that effectively uses the Internet as a resource. Whether searching for lesson ideas, teacher hints, discussion groups, or web pages for students to utilize, the Internet presents an expansive world of possibilities for the one-computer classroom.

#### Analysis and Discussion

The plastic has been removed from the idol. At first glance, it is but a machine plugged into the wall. The task of integrating this machine into the classroom consists of more than choosing a fun Internet site, a piece of software, or treating it as an addition to the curriculum. To the right of the computer lies a stack of books to assist in the integration of the computer into the classroom. Picking up the top book, The Teacher-friendly Computer Book (Suid, 1984), and flipping through the pages reveals a supporting reality; the computer should be thought of as a tool. Although the book is sixteen years old, the importance of what it proclaims on the use of computers has not aged. Keeping up with all the changes in technology is impossible (Suid, 1984), but striving to keep current is important. Why people choose to use a computer is made clear; to revise how the world works, plays, and communicates. The book

moves along, offering suggestions and examples on uses of computers that can be adapted to today's one-computer classroom situation.

The next book on the stack, Great Teaching in the One Computer Classroom (Dockterman, 1991) also approaches the computer as a tool helping teachers and students reach their goals. In offering distinct examples and ideas, it divides them by teacher use, presentation possibilities, discussion generator, and cooperative learning. It is a quick, easy book to use to help teachers understand and use the computer as a tool in the classroom.

When designing instruction to integrate curriculum, the book Instructional Technology for Teaching and Learning (Newby, Stepick, Lehman, Russell, 1996) becomes a guide to help plan, implement, and evaluate instructional material. The book addresses the computer as a tool for creating and delivering instruction.

Choosing reliable software to enhance existing curriculum can be a time consuming task. High school level teachers have the most difficult time to find appropriate software compared to elementary (Zehr, 2000). Time needed to locate good sources for software review and the low amount of high quality software add to the frustration (Zehr, 2000). When choosing material to use in the classroom, unbiased evaluations of educational software can be found on the *Ohio SchoolNet* site (SchoolNet Software Review Project [SSRP], 1997). This site includes an overview of the software and comments by teachers who have examined the software for student use in grades three to five.

One use of the computer pertains to connecting to the Internet, bringing other possibilities to effectively integrate this tool. The Internet plays a two-fold role. The Internet lists a plethora of ideas on computer use in the classroom apart from its intrinsic educational value. A simple search on the Internet presents a starting point with a bulleted list and tips for the one-computer classroom; *Strategies and Applications for the One Computer Classroom* (Burkhart, 1999). The site includes specific instructional examples with links to educational sites that have been used successfully in the classroom.

Lessons, ideas, and supporting resources can be found on-line. Teachers who have been using the computers in their classroom are placing information on the Internet to share their experience and knowledge. An Australian teacher with more than ten years of using computers in the classroom has designed his own site, *Computers in the Primary Classroom* (Morgan, 2000). Morgan covers Internet use with students, recommends software, discusses teacher uses of computers, and addresses the benefits and time management needs of computers in the classroom rather than a lab.

The Internet provides communication with teachers all over the world. Educational resources are abundant, and diverse, as a look at the sites *TeachersFirst* will demonstrate. Like many educational sites, this is a free service that provides lessons and Internet resources. *TeachersFirst* material is reviewed and organized to make searching its site a simple task (Network for Instructional TV, 1998). Another excellent resource for teachers wanting to integrate technology into the classroom is found at the Internet site titled *Eduscapes* (Lamb, 2000 a). At the Eduscapes site

teachers will find a bulletin board and chat section which offers ideas from teachers for using technology in the classroom.

Looking for effective ways to utilize the Internet in the curriculum can be found with a WebQuest, an on-line activity developed by Bernie Dodge in 1995. "A WebQuest is an inquiry-oriented activity in which most or all of the information used by learners is drawn from the web" (Dodge, 1999).

Companies that produce educational materials that integrate technology are abundant. *Teacher Created Materials* publishes supplementary materials for curriculum and educational software. The book HyperStudio for Terrified Teachers is one example of their many products (Fleck, 1997). HyperStudio software allows teachers and students to create their own interactive projects using text, sound, graphics, video, and Internet links (Fleck, 1977).

Wherever the teacher begins integrating the computer into the classroom, the challenge to find methods that will utilize this tool effectively will be present. Even one computer in the classroom can enrich student learning and become an integral part of preparing students for our ever-changing world. Going from idol to add-on to indispensable utensil will take time, planning, communication, observation, and creativity.

Understanding computers will help teachers and students choose what to embrace and what to resist (Suid, 1984). The teacher or student who understands that the computer is a tool can harvest four major applications: organization, communication,

producing and presenting educational materials, and modeling effective uses for others.

### Teacher Uses

Organization. When a teacher is creating units of instruction, gathering ideas to incorporate into instruction, or managing data on students, the computer can offer many advantages as an organizational tool. Basic word-processing software makes creating and filing instructional materials orderly tasks. With its editing ability these documents can be easily revised or updated as needed. The teacher can use the computer to monitor student progress, maintain student portfolios, and increase their knowledge base.

A spreadsheet or database allows for creation of student information, which can include some basic facts as parent names, phone numbers, or birth dates. Further information can be added, such as hobbies, pets, special talents, or favorite books. Additional software is available for purchase to use for grading purposes. Teachers who spend the time making the computer a part of their organizational process can benefit in the end by acquiring easy access to their information and eliminating traditional paper filing (Dockterman, 1991, p. 52).

A scenario sees a teacher planning a unit for fifth grade students to learn about local history. The teacher has written goals, objectives, and arranged pre-activities. A rubric has been designed on the computer to effectively assess the students' progress as they go through the lessons. The next step is to prepare communication to share the plans with students and parents.

Communication. Typing up and printing off a parent letter is an obvious chance to open communication between the teacher and home. It looks professional and allows the parents an insight into what is happening in the classroom. By designing a class logo or slogan, a special tip section, or including a challenge puzzle, the classroom teacher can create a personal touch and grab the attention of both parent and student. If creating a class logo seems overwhelming, a visit to *Discovery.com* can supply a graphic they have available in their clip art section; the teacher must take note of the copyright guidelines.

Email has become another source of communication between teachers, parents, students, and experts. A teacher can subscribe to a listserv and receive announcements and information from educational organizations. An excellent choice for Iowa teachers is presented by *Iowa Public Television (IPTV)*. This educational listserv provides information and times of educational programs, free teacher resources, and tips on effective usage of their programs (IPTV, 2000). This resource is of great help in planning classroom learning to correspond with IPTV offerings over the Iowa Communications Network (ICN). The ICN connects classrooms across the state using fiber optic digital transmission to provide full color, interactive video and audio communication.

An on-line computer gives the teacher a unique resource at her fingertips for amassing ideas for the classroom. The Internet site *TeachersFirst* has a content matrix organized by subject and grade level, professional resources, and a section for sharing ideas and lessons with others (NITV, 1998). This is a comprehensive site that is easy

to navigate. Teachers can use this site to enhance their curriculum and gain inspiration. One example of teachers sharing ideas at *TeachersFirst* is personalizing name tags, folders, and parent letters by using photographs of the students taken with a digital camera.

With the advent of Email, teachers can communicate with other teachers across the state or across the globe. Sharing of information and ideas over the Internet brings a wealth of knowledge and experience to the teacher without investing in time away from the classroom. Lesson plans, classroom management, current news, up-to-date information, and professional articles are a few topics of interest that can be acquired free at educational sites.

An Email message from IPTV brings with it an exciting opportunity to the teacher preparing the local history unit. IPTV prepared interactive classroom activities using the Internet and ICN titled *My Community Connections*, which offers fifth through eighth grade students the opportunity to investigate Iowa history. Students involved will explore their own community, how it's changed, and what the future may hold. Working in pairs, students will choose a theme, and present their findings over the ICN to a peer group in another participating Iowa school. To communicate this event, the teacher can draft a parent letter and save it on the classroom computer to relay what the students will be working on.

Producing and Presenting. Creating classroom materials has never been easier with the introduction of the computer in the classroom. Teachers can create charts, certificates, newsletters, direction sheets, curriculum-oriented puzzles, graphic



organizers, tests, databases, or individualized lessons. These can be stored and used again, with no need to reinvent the wheel.

The one computer can be used effectively in small groups. With the help of a television and necessary hook-up devices, a whole class can view the screen when the teacher is presenting. Presentations can include recording information from a survey into a graph, listing student ideas in a brainstorming session, demonstrating writing and editing skills, learning a new software program, sharing important information through a slide show presentation, previewing Internet sites, or taking the class on a virtual field trip.

Making on-line experiences safe, productive, and time effective can be easy with Internet start pages. As a guide for her students, the teacher can preview and annotate sites, or give specific objectives for their use, and save them in a folder for students to access when they are ready to use them (Burkhart, 1999).

The teacher doing the local history unit can ask her students to brainstorm a list of possible resources to accumulate information about their local area. Using the word processor on the computer, large text for the students to view easier, the recording can begin. This list can easily be manipulated by placing it into categories such as books, newspapers, agencies, and people, prioritizing where to search first, or dividing the options among groups. This list will not be erased off the chalkboard or misplaced by the teacher.

Using a collection of pictures available in clip art on the computer, the teacher can prepare instructional material that presents visual information along with text. Not

having to rely on creating visuals, clip art makes this step a quick process (Newby, Stepich, Lehman, Russell, 1996). With the addition of desktop publishing software, a teacher can manipulate graphics obtained from such sources as photographs, the Internet, and clip art along with text to create their own professional layouts.

Modeling. Modeling takes place when the teacher uses the computer for organization, communication, material production, or classroom presentations. Further support can be in forms of computer rules posted in clear view, self-help instruction sheets when using the Internet, software, or a C.D. ROM, or a binder to collect and show examples of student work

A bulletin board by the computer could include a town map showing computer uses in the community (Suid, 1984, p. 44). Inviting community guest speakers to share how they use the computer in the workplace, posting newspaper articles on computers, and encouraging students to read computer magazines are all feasible in modeling computer use.

Students involved with the local history unit can record the activities in a word document. They can include hints and problems with the process. This will be an asset to the teacher and her colleagues when integrating the computer with other lessons and activities.

Learning embraces doing. Teachers can present instructional situations that set up learning-by-doing with the computer as the tool, guiding the students towards the goals of the instruction.

Just as the teacher can use the computer for communicating, organizing, producing and presenting materials, or modeling, so can the student. The teacher's task is to engage rather than entertain students. Teachers must ask essential questions and address individual student needs when integrating the computer into the curriculum. The questions pertain to age, entry-level skills, copyright issues, available resources, what she wants students to know, how can the computer help, and will it involve individual or group work at the computer. Designing a computer experience checklist can help guide the teacher in developing lessons and watching the student's progress (Suid, 1984, p. 24). The students can fill out a checklist before instruction begins (see Appendix A).

Students can only begin to utilize the computer as an indispensable tool when the teacher has designed a clear plan of instruction. The teacher must write specific goals and objectives, place the computer as a resource tool where and when it is beneficial in the instruction, and develop assessment guides.

### Student Uses

Organization. Students can use the computer to save and store information on research. Learning to create a database offers organization and manipulation of information they have stored to solve problems.

An enormous advantage the computer can offer comes in the form of electronic portfolios. Saving work chosen by the student and teacher in a format that is small, orderly, dated, can be made into multiple copies, and is an excellent learning

experience benefits all concerned. Criteria can be set up, students may evaluate and choose work to submit and teachers may submit their own choices. A portfolio can be saved on a disc and viewed by parents at conferences or taken home. A copy can be saved to move on with the student as they go through school. The electronic portfolio can be used as an authentic assessment, showing growth in the student's development.

The students can make use of the software *Inspiration* to organize information they have collected about their local history. One example is choosing an old building, or a series of buildings with similarities. After doing research on the building, a web is made using the *Inspiration* software. With the building in the center of the web, strands are placed out from the center, which include vital statistics. The statistics could include dates of when the buildings were built, special features, connections to other historical events, similarities or differences, name of the architect, and style of architecture. Students could compare their findings with their peer group from the other school.

Communication. To communicate ideas, ask questions, or share events is a necessary aspect of authentic learning. With a computer the student can write, edit, and illustrate individual or group stories. A class or school newspaper can be used to share events, ideas, or computer tips. Students can write letters to family members, design an invitation to a classroom event, use a spreadsheet to produce a graph, or write a book report with a hyperlink to an on-line review or the author's Internet site. E-pals, web pages, contacting an expert offer interactive, global communication.

The IPTV learning opportunity will engage students by using the Internet to do their research, a word processor to organize their findings, Email to contact experts and share information and ideas with their peer group. The computer is not and should not be the center of attention, but the tool to generate discussion, share thoughts, and spark student interaction (Dockterman, 1991, p. 79).

Producing and Presenting. One computer in the classroom lends itself as a workstation or learning center (Burkhart, 1999). Students can take turns using the computer in small groups or as individuals while the rest of the class is engaged with other stations or centers. Time management can be obtained by defining the task, using a timer, or creating a chart indicating students who have taken a turn (Burkhart, 1999).

The students working on the history unit will produce reports to present over the ICN about their local history. Using a scanner, students can scan photographs of local buildings, documents, or family pictures to use in their presentation (Lamb, 2000 b). An audience from outside the classroom presents a circumstance of authenticity. When the work is authentic, and so serves a purpose, it provides motivation.

A simulation is another example of authentic learning. Simulations motivate students considering the age and developmental level of the students. Since they are hands-on activities students are not just listeners or observers but participators. The teachers are no longer presenters of information. Simulations that are designed to portray accurate situations are opportunities that engage the students in active roles close to real life. WebQuests are one such simulation, and an option to continue

investigating past the ICN presentation in a cooperative learning situation. Numerous ones have been developed by teachers and are available on the Internet to use.

WebQuest U.S.A. (Hunter, 1999) is a simulation that could take the students beyond their local history and cover another state. This WebQuest asks the students to choose a client, consisting of a family, and produce a vacation package for them. They need to research a state, complete a vacation guide, and present their decision to the class.

The software *HyperStudio* presents another method to produce and present student projects. With help from the book HyperStudio for Terrified Teachers (Fleck, 1997), a novice or an expert computer user, can be furnished the user with lessons that help to attain working knowledge of the software. It is structured with a lesson overview, materials and entry-level skills needed, and step-by-step instructions for students and teachers (Fleck, 1997). Students can produce individual or group projects with *HyperStudio*.

Using a scale from 1 to 5 with 5 being the highest, the SSRP review on the book HyperStudio for Terrified Teachers rated it 5 on student engagement, 4.6 on interaction, and 3.7 on technical characteristics which concerns the ease of installation and student use (SSRP, 1997)

When choosing software to fit into a curriculum, designing and using a software review sheet for teachers to complete can benefit others (see Appendix B). Morgan reviewed *HyperStudio* software after using it successfully with fifth and sixth grade students. He highly recommends the software for both student and teacher projects,

emphasizing the non-linear quality, ease of use, and student enthusiasm (Morgan, 2000).

Research has shown that cooperative learning can benefit the students by utilizing communication skills and improving the acquiring and retention of content and skills (Dockterman, 1991). When a student goes through the procedure of presenting material to an audience, they must learn the content and consider how to present the information so the audience will understand it.

Modeling. A student that is working on the classroom computer has the opportunity to model appropriate behavior. The personal computer was designed to be used by a single individual, however small groups of two, three, and four can work collaboratively (Newby, Stepich, Lehman, Russell, 1996). Students can take on special roles when working in small groups at the computer, such as keyboarder, mouse operator, timer, leader, editor, or spell checker (Burkhart, 1999). With only one computer in the classroom it can be an advantage to train small groups of students on particular software and then have them train other students and teachers (Suid, 1984).

### Conclusion and Recommendations

A majority of schools in the United States utilize the computer to teach isolated skills such as word processing and spreadsheets or to play educational games (President's Committee of Advisors on Science and Technology, 1997). Integrating the computer to function, as an effective and efficient educational instrument, is the next step to take the computer from add-on to indispensable tool.

Classroom management is vital to developing an environment that reflects effective and efficient learning. The Internet site, *Eduscapes*, offers on-line workshops to help guide teachers through the process of using the computer tool within their curriculum (Lamb, 2000 b). The site includes successful steps on how to involve teachers in the process and educational links to use in the classroom when integrating technology.

The computer connected to the Internet has been one of the most stimulating influences on what the computer evolution can bring. With the world being admitted into the classroom students need to learn to how to state goals, ask good questions, and develop effective methods to communicate with one another. Using or developing a WebQuest (Dodge, 1999) is one effective method that presents a scenario where students take charge of their learning.

Teacher preparation that includes in-depth and continued support on how to integrate technology into the curriculum is essential to increase successful student computer usage (President's Committee of Advisors on Science and Technology, 1997). Teachers will benefit from guidance in choosing software, timely technical support, mentoring, team meetings, and involvement in developing a vision for technology in their school.

What the one computer classroom will evolve into begins with the teacher. Teacher training, sharing, and planning time are vital keys in integration of the computer into the curriculum. Learning to use the computer is only one aspect of integrating the tool into the classroom. The teacher who states goals, asks questions, is selective in



instructional material choices, and reflects on past experiences will discover the computer as indispensable in her repertoire of tools. Time is needed for teachers to create a classroom that takes the computer from an idol to an add-on to an indispensable tool.

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## Appendix A: Student Computer Knowledge Checklist

Student Name	Date	Computer at home Windows or Mac	Comments
<b>Computer Hardware</b>			
<input type="checkbox"/>	Turning on computer		
<input type="checkbox"/>	Shutting down computer		
<input type="checkbox"/>	Keyboarding skills		
<input type="checkbox"/>	Mouse skills		
<input type="checkbox"/>	Create and Save Files		
<input type="checkbox"/>	Understands and uses computer terminology		
<input type="checkbox"/>			
<b>Other Hardware</b>			
<input type="checkbox"/>	Printing		
<input type="checkbox"/>	Uses CD-ROM		
<input type="checkbox"/>	Uses floppy discs		
<input type="checkbox"/>	Uses scanner		
<input type="checkbox"/>	Uses digital camera		
<input type="checkbox"/>			
<b>Computer Software</b>			
<input type="checkbox"/>	Word processor		
<input type="checkbox"/>	Spreadsheet		
<input type="checkbox"/>	Database		
<input type="checkbox"/>	Uses several applications simultaneously		
<input type="checkbox"/>	Paint and draw programs & graphics		
<input type="checkbox"/>	Uses multi-media applications		
<input type="checkbox"/>			
<b>Internet Skills</b>			
<input type="checkbox"/>	Uses browsers		
<input type="checkbox"/>	Book-marks sites		
<input type="checkbox"/>	E-Mail		
<input type="checkbox"/>	Downloads		

