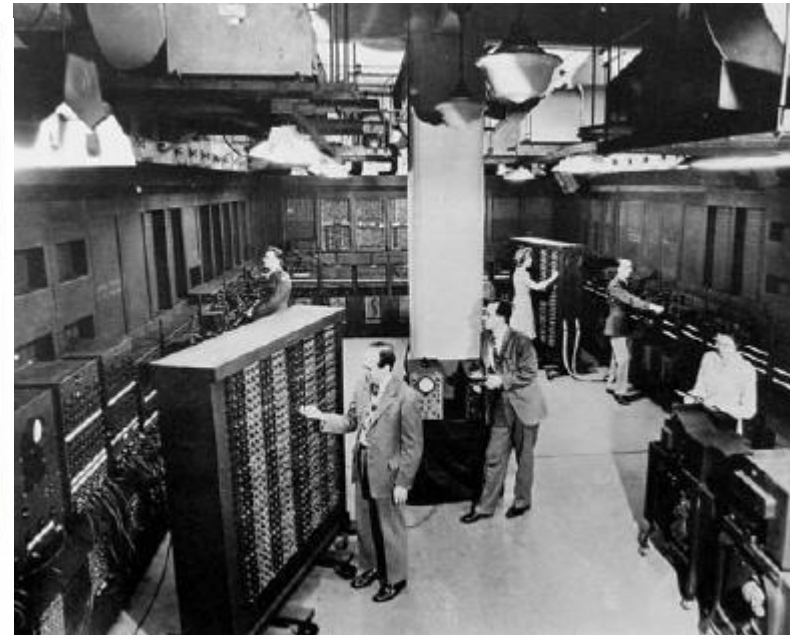


1. The importance of computers in scientific research

Computers have always assisted to solve the problems faced by the mankind. Since the time of invention the sizes of computers have drastically reduced from the size of a room to the size that can be accommodated in a human palm. The word “computer” means something which computes or a machine for performing calculations automatically, but today “computer” means not merely a calculator. It performs a vast variety of jobs with tremendous speed and efficiency.



1. The importance of computers in scientific research

The **main reasons** why computers are so important in scientific research:

- 1) SPEED** a computer can process numbers and information in a very short time. So a researcher can process and analyse data quickly. By saving time the researcher can conduct a further research. A calculation that may take a person several hours to process will take computer mere minutes, if not seconds.
- 2) ACCURACY** a computer is incredibly accurate. Accuracy is very much important in scientific research. Wrong calculation could result an entire research or project being filled with incorrect information.
- 3) ORGANIZATION** we can store millions of pages of information by using simple folders, word processors and computer programmes. Computer is more productive and safer than using a paper filing system in which anything can be easily misplaced.
- 4) CONSISTENCY** a computer cannot make mistakes through “tiredness” or the lack of concentration like a human being. This characteristic makes it exceptionally important in scientific research.

2. The role of computer technologies in major phases of the research process

The research process includes series of **actions necessary to carry out the research effectively.**

The following order concerning various steps provides a useful procedural guideline regarding the research process:

- 1) **formulating the research problem;**
- 2) **extensive literature survey;**
- 3) **developing the hypothesis;**
- 4) **preparing the research design;**
- 5) **determining sample design;**
- 6) **collecting the data;**
- 7) **execution of the project;**
- 8) **analysis of data;**
- 9) **hypothesis testing;**
- 10) **generalisations and interpretation;**
- 11) **preparation of the report or presentation of the obtained results.**



2. The role of computer technologies in major phases of the research process

There are **five major phases of the research process**:

- 1) conceptual phase;
- 2) design and planning phase;
- 3) data collection phase;
- 4) data analysis;
- 5) research publication.



2.1 Conceptual phase



Computer technologies help for searching the literatures and bibliographic reference stored in the electronic database of the world wide webs. Thus, it can be used for storing relevant published articles to the retrieved whenever needed.

The conceptual phase consists of the formulation of the research problem, extensive literature survey, theoretical frame work and developing the hypothesis.



2.2 Design and planning phase

The **design and planning phase**

consists of research design preparation and determining a sample design. It also includes population, research variables, a sampling plan, a reviewing research plan and a pilot study. The role of computer technologies for sample size calculation reveals itself in certain software. The software is available to calculate the sample size required for a proposed study.



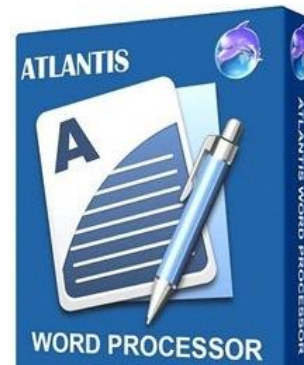
2.3 Data collection phase



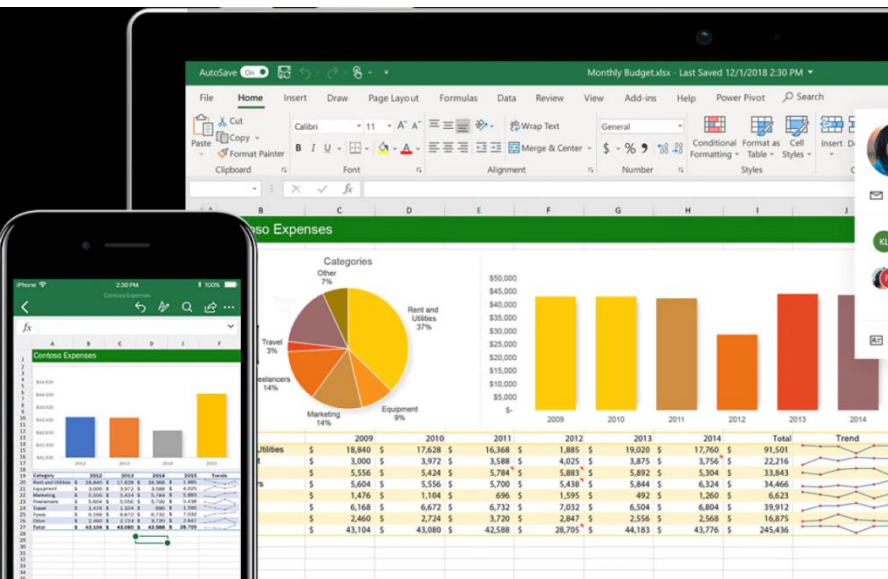
The **design data collection phase** is made up of collecting and preparing the data for analysis, data collection and storage, data exposition.



SPSS data editor
UltraEdit

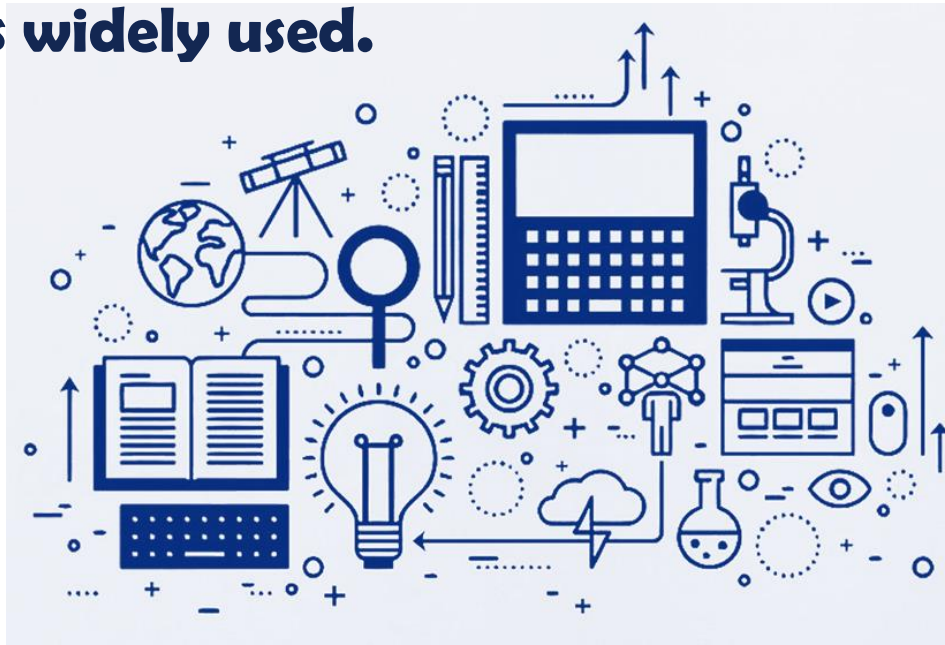


Notepad VS WordPad



2.4 Data analysis

The **data analysis phase** consists of the analysis of data, hypothesis testing, generalisation and interpretation. This phase mainly displays statistical analysis of the data and interpretation of results in a graphical form. Many of software are now available to perform the mathematical part of the research process i.e. the calculations using various statistical methods. Software like SPSS and spreadsheets is widely used.



3. Computer applications used in scientific research

There are various computer applications used in the scientific research for **data storage, data analysis, scientific simulations, instrumentation control and knowledge sharing.**

Data storage is possible in SPSS data file, lotus spreadsheet, excel spreadsheet, ASCII/DOS text file.

Data analysis is made possible using specially designed algorithms that are implemented by computers. Data from different sources can be stored and accessed via computer networks set up in research labs, which makes collaboration simpler.

Scientific simulation is a mathematical modelling of a problem and a virtual study of its possible solutions. Problems which do not yield themselves to experimentation can be studied through simulations carried out on computers.

3. Computer applications used in scientific research

Instrumentation control

Most advanced scientific instruments come with their own on-board computer, which can be programmed to execute various functions. For example, the Hubble Space Craft has its own board computer system which is remotely programmed to probe the deep space. Instrumentation control is one of the most important applications of computers.

Knowledge sharing through Internet

Lastly, in the form of Internet, computers have provided an entirely new way to share knowledge. Today, anyone can access the latest research papers that are made available for free on websites. Sharing of knowledge and collaboration through the Internet, has made international cooperation on scientific projects possible.

3.1 Statistical Analysis Tool: SPSS

SPSS is the most popular tool for statisticians.

Statistical Package for Social Sciences provides

Data view & variable view

Measures of central tendency & dispersion

Statistical inference

Correlation & Regression analysis

Analysis of variance

Non parametric test

Hypothesis tests: T-test, chi-square, z-test, ANOVA, Bipartite variable

Multivariate data analysis

Frequency distribution

Data exposition by using various graphs like line, scatter, bar, ogive, histogram, pie chart

3.2 Data Analysis Tool: Spreadsheet packages

A spreadsheet is a computer application that simulates a paper worksheet. It displays multiple cells that together make up a grid consisting of rows and columns, each cell containing either alphanumeric text or numeric values.

Microsoft Excel is popular spreadsheet software.

Others spreadsheet packages are Lotus 1-2-3, Quattro Pro, Javeline Plus, Multiplan, VisiCalc, Supercalc, Plan Perfect etc.

3.2 Data Analysis Tool: Spreadsheet packages

OTHER STATISTICAL TOOLS

SAS, S-Plus, LISREL, Eviews etc.

WORD PROCESSOR PACKAGES

A word processor (more formally known as document preparation system) is a computer application used for the production (including composition, editing, formatting, and possibly printing) of any sort of printable material.

The word processing packages are Microsoft Word, Wordstar, Word perfect, Softward, Akshar (Gujarati), Amipro etc.

3.3 Presentation software

A **presentation programme** is a computer software package used to display information, normally in the form of a slide show.

It typically includes **three major functions**: an editor that allows text to be inserted and formatted, a method for inserting and manipulating graphic images and a slideshow system to display the content.

The presentation packages are **Microsoft Powerpoint, Lotus Freelance Graphics, Corel Presentations, Apple keynote etc.**

3.4 Database management packages (DBMS)

Database is an organized collection of information. A **DBMS** is a software designed to manage a database.

Various Desktop Databases are Microsoft Access, Paradox, Dbase or DbaseIII+, FoxBase, Foxpro/ Visual Foxpro, FileMaker Pro Commercial Database Servers that supports multiuser are Oracle, Ms-SQL Server, Sybase, Ingres, Informix, DB2 UDB (IBM), Unify, Integral, etc.

Open source Database packages are MySQL, PostgreSQL, Firebird etc.

3.5 Browsers and search engines

A **web browser** is a software application which enables a user to display and interact with text, images, videos, music, games and other information typically located on a Web page at a website on the World Wide Web or a local area network. Examples are Microsoft Internet explorer, Mozilla Firefox, Opera, Netscape navigator, Chrome (google browser), Safari

Among **search engines** we can mention:

Google (popular search engine)

Yahoo!

Webcrawler

Excite

Altavista

3.5 Browsers and search engines

For Online Data/Documentation Management

**(to manage your documents online) you can use
Dropbox, Google Drive, Google Docs, MS Sky Drive (free)
Microsoft 365 (paid version)**

**For online data collection (To collect data online from
different users)**

Online forms

Online questionnaires

Online surveys

Collaboration tools

Skype: voice and video conferencing

Zoom: voice and video conferencing

Google Hangouts: voice and video conferencing

Modern Research tools Zotero Evernote

3.5 Browsers and search engines

Modern electronic research tools, like Zotero and Evernote, make the collection of research data, and collaboration between colleagues possible, which that in the past would have been difficult, expensive, or even impossible. They also save large amounts of time citing and creating bibliographies. Evernote allows the user to capture digital content, including web pages, PDF files or snippets of web pages, organize them, annotate them, share them, publish them and search them.

4. The analogue technology and the computer technology in a qualitative research

Perhaps the earliest use of a technology in the qualitative research was when researchers first used tape recorders in their field studies to record interview sessions. In one sense this was clearly an easier way for researchers to keep a record of events and conversations, but it had two unforeseen consequences. First, it began to shift the effort of work in making a record of sessions from the researcher (who traditionally took handwritten notes) to others, such as secretaries and audio typists. This separation had an impact not only on how close to (or distant from) the data the researcher could remain, but also on the relationship between the data and the emerging analytic ideas of the researcher.

4. The analogue technology and the computer technology in a qualitative research

The dual impact of new technology both on what kinds of data can be collected and recorded and on what kinds of analysis it makes possible has continued to the present day. In the 21st century, the use of a new computer technology still raises issues like what should be analysed, how it should be analysed and in what ways the knowledge and understanding gained are different and more or less well founded than those gained in more traditional ways. The papers in this issue address both these impacts of the technology: new ways of recording and collecting data, and new ways of undertaking the analysis. Most researchers recognise that in most cases, the use of new technology usually affects both.

4. The analogue technology and the computer technology in a qualitative research

Audio recording is an analogue technology, as are film and traditional video. There is a long history of their use in many areas of social and psychological research and especially in anthropology. Recent changes in this technology have taken several forms. First it has become cheaper and more widespread. This means that this technology is more available to researchers, but also that the people being researched are more used to being recorded by the technology and even familiar with using it themselves. For example, in the case of video, people are now used to being recorded whether as part of a “holiday video” or as part of the now widespread CCTV (Closed Circuit Television) security systems. They are often familiar with making their own video recordings and with “reading” the wide variety of video material they are presented with.

4. The analogue technology and the computer technology in a qualitative research

One of the most recent developments in video and audio has been the rapid introduction of digital technology. Not only has this made the technology cheaper and more widely used, but also it has made possible new ways of manipulating and analysing the data collected. This can be seen particularly in digital video where there is now some excellent software that can be used to display, examine and edit digital video recording in ways that are much easier (and cheaper) than non-digital video.

4. The analogue technology and the computer technology in a qualitative research

The development of the computer technology and particularly the growth of the Internet has created not only new ways in which researchers can analyse their data, but also created whole new areas from which data can be collected and ways in which it can be collected. The former include discussion lists, text forums, personal Web pages and videoconferences. The latter include usage logs, text content logs as well as digitised recordings.

At its most basic, the Internet, and e-mail in particular, offers a new way of carrying out the traditional, qualitative, face-to-face interview. One key advantage here is that there is no need for transcription. Moreover, the e-interview might enable research about new social groupings, given constraints of time, travel and financial resources do not apply.

5. The quality of qualitative research

Much of the thinking about the quality of research in general originates in ideas derived from the examination of quantitative research. Here there is a strong emphasis on ensuring the validity, reliability and generalizability of results so that we can be sure about the true causes of the effects observed. There has been much debate about whether such ideas can be applied to qualitative data and, if they are applicable, what techniques might be available to qualitative researchers to help ensure the quality of their analysis.

5. The quality of qualitative research

Because the data are voluminous, we have to be selective – and we can select out the data that doesn't suit. Because the data are complex, we have to rely more on imagination, insight and intuition – and we can quickly leap to the wrong conclusions.

We have already examined some of the software available that makes the storage and accessing of such material possible for qualitative researchers. In particular using formats such as HTML and PDF researchers can link together a wide range of materials, both collected data and research notes and a variety of media types.

6. Computer-assisted qualitative data analysis software

Whatever researchers' choice, digital convergence will probably reinforce the demand from users for universal, standard data formats, so that files can be easily transferred from one software package to another and even from one CAQDAS programme to another. Already, several CAQDAS programmes allow the import of RTF, AIFF, WAV, PIC, GIF and MPEG files and Tator and ATLAS.ti are using XML and HTML as a medium for exporting text data files.

6. Computer-assisted qualitative data analysis software

At the moment some programmes allow automatic coding based on the mark-up of documents and it is possible to use search facilities (sometimes by incorporating powerful tools such as GREP) to help find text for coding. But in the future this might be further assisted by integration with concordance generators and thesauruses so that the software can search in intelligent ways for similar text and even for negative cases. There is already some software in development in the US (Qualrus) that uses artificial intelligence to examine the way users have already coded text in order to find further text to code.

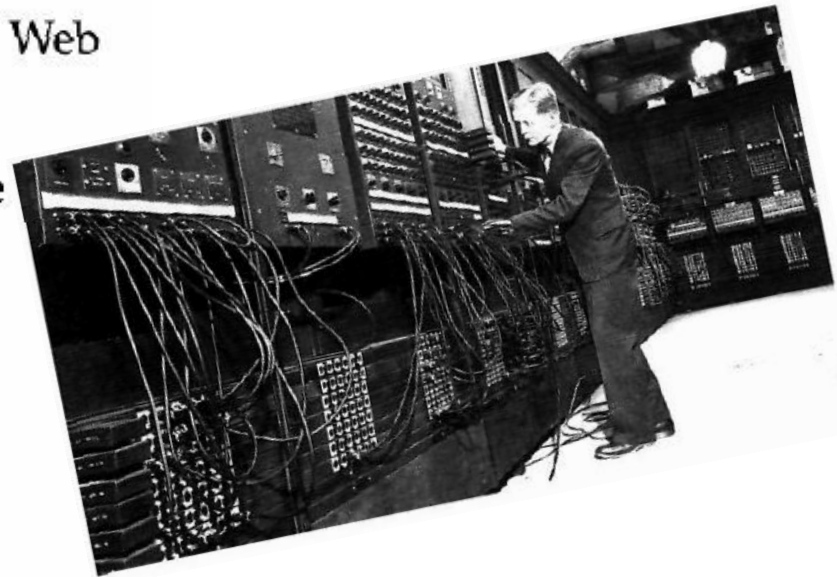
Computer technologies in scientific research

The use of computer technologies in the scientific research is so extensive that it is difficult to conceive today a scientific research project without a computer. Many research studies cannot be carried out without the use of a computer particularly those involving complex computations, data analysis and modelling. Computer technologies in the scientific research are used at all stages of study – from proposal/budget stage to submission/presentation of findings.

Computer technologies in scientific research

Are you a technophile or a technophobe? Do this quiz and find out. Then check your answers on page 88.

- 1 When was the first computer invented?
a) 1936 b) 1951 c) 1974
- 2 Which company was the first to develop personal home-use computers?
a) IBM b) Macintosh c) Microsoft
- 3 What does WWW mean?
a) Working With the Web b) Well Worked Web
c) World Wide Web
- 4 Which country does the following site come from? <http://www.outandabout.co.nz>
a) Norway b) New Zealand
c) The Netherlands
- 5 What does the 'e' in e-mail stand for?
a) electrical b) electronic c) efficient



Computer technologies in scientific research

- 1 Correct the mistakes in each of these sentences.
 - a) I'll finish this exercise by the time the bell rings.
 - b) This time tomorrow I'll sit on an airplane.
 - c) In twenty years' time, most people will have used their TV as the screen for their computers.
 - d) By the time I finish my computer course, I'll be spending over 10,000 pounds on tuition fees.
 - e) Many scientists believe it's impossible that one day we live on other planets.
 - f) I don't believe that computers will ever developed to be more intelligent than humans.
 - g) Don't worry about moving to a new country, after six months you have made loads of friends.
 - h) It's Saturday tomorrow, so I won't be probably going in to the office.

Computer technologies in scientific research

- 2 Complete these sentences with *will* and an appropriate infinitive form of the verb in brackets.
- a) By this time next week he _____
(finish) the course.
 - b) I suppose he _____ (be) late as usual.
 - c) I don't think he _____ (have) enough money to buy that car.
 - d) This time next week I _____
(start) my new job.
 - e) My car _____ (repair) by now so I'll just pop to the garage to pick it up.
 - f) In the year 2010 more than 50% of the population _____ (work) in jobs connected with the Internet.
 - g) If they continue selling like this, we _____ (sold) a million copies of the CD by the end of the week.

Computer technologies in scientific research

- 3 Write predictions or assumptions based on the facts given below using *will* and the prompts in brackets.

Example

You know Sue has got a hard day at work today.

(she / very tired / get home)

She'll be very tired when she gets home.

- a) Richard usually plays football on Monday nights at 8 o'clock. It's Monday today. (he / at home / 8.30 he / football)

- b) The exercise only takes 10 minutes. It's 8.45 now. (you / finish the exercise / nine o'clock)

- c) The film you're watching is a typical action movie. (the good guys / win / and the bad guys / lose)

- d) Your brother is on holiday in the Caribbean. He loves diving. (he / probably dive / right now)

- e) It rains a lot in London. You're going there on holiday next week. (I / probably need / umbrella)

- f) You took the film to the Photo shop yesterday. They offer a 24-hour photo development service. (my photos / probably develop / now)

- g) Maria is studying medicine. She's doing very well in her studies. She's only 23. (she / work as a doctor / time / thirty)

Computer technologies in scientific research

- 4 Use the discourse markers in the box to link the beginning of the statements in A to their endings in B. Use each discourse marker once only.

but now this has meant that in this sense
but probably more importantly after all
as well as

A

- a) Computers have helped put people in touch with each other *as well as* (4)
- b) The progress of the Internet is continually being exaggerated. _____
- c) Clearly the Internet has increased the speed of communication. _____
- d) All companies expect their workers to be computer literate. _____
- e) Not only has the computer revolution meant that people can work from home, _____
- f) Less than 10% of the world's population has access to e-mail. _____

B

- 1 Cyberspace can be said to be the domain of a privileged elite.
- 2 with the introduction of the laptop they can work anywhere.
- 3 30% of the world's population don't have access to electricity, let alone access to a computer.
- 4 *helping them work together, despite living in different cities or even countries.*
- 5 it has drastically reduced its costs.
- 6 employees without computer skills are now finding it harder to get a job.

Computer technologies in scientific research

- 5 Complete the text with the discourse markers in the box.

but for a calendar year also this means that
but in contrast to in this sense
but, more importantly

Castaway, a new reality TV phenomenon, has recently hit our screens in many countries. The original programme was conceived in the UK. It was inspired by the incredible success of the *Big Brother* programmes around the globe, and sees a group of 36 people, representing a cross section of society, volunteering to inhabit a deserted village on a remote island. As in *Big Brother*, their every move will be filmed, recorded and broadcast, (a) _____

Big Brother, the participants are not totally among strangers. They are allowed to participate as family groups and (b) _____. *Castaway* is very different, showing a much broader slice of life, with children and older people getting to grips with the difficulties created by the isolation of living on a small island. Another major difference is that the castaways are to remain on the island not for ten weeks, (c) _____, and there is no opting out possible.

(d) _____ the families have to get on together for a whole year, (e) _____ for the TV company, it (f) _____ means that the viewers will now be glued to the box for a full twelve months and not just ten weeks.

Computer technologies in scientific research

Vocabulary

1 Circle the correct preposition in these expressions.

- a) no limit *of / to / for*
- b) a good chance *by / from / of*
- c) have in store *from / of / for*
- d) *at / in / on* the expense *to / of / from*
- e) come up *by / in / against*
- f) *in / for / at* economic reasons
- g) the turn *of / at / on* the century
- h) *at / by / on* far the most
- i) keep ahead *to / from / of*

Computer technologies in scientific research

- 2 Complete the following text with the correct expressions in 1.

At (1) _____ when people began to look back at the past hundred years, few mentioned the video game as being a major player in the 20th century. In fact there has been a huge increase in the sale of home consoles and now about half the population of western Europe has facilities to play games on their TV or computer.

The boom started with *Space Invaders* which was (2) _____ influential game on the market in the 1970's. This now seems very dated compared with the new 3D games and virtual reality systems on offer. There seems to be (3) _____ the complexity of the modern video game as the manufacturers battle it out to (4) _____ each other.

The problem is that children spend time on them (5) _____ other forms of recreation like sport. In Britain, the government has (6) _____ a barrage of complaints from worried parents for not taking more decisive action. Video games are often extremely violent and one wonders what the manufacturers (7) _____ us next. The government has done very little (8) _____. The video games industry creates thousands of jobs and valuable revenue for the government. Recently, however, the government has changed its stance, and there's (9) _____ legislation being put in place in the future.

Computer technologies in scientific research

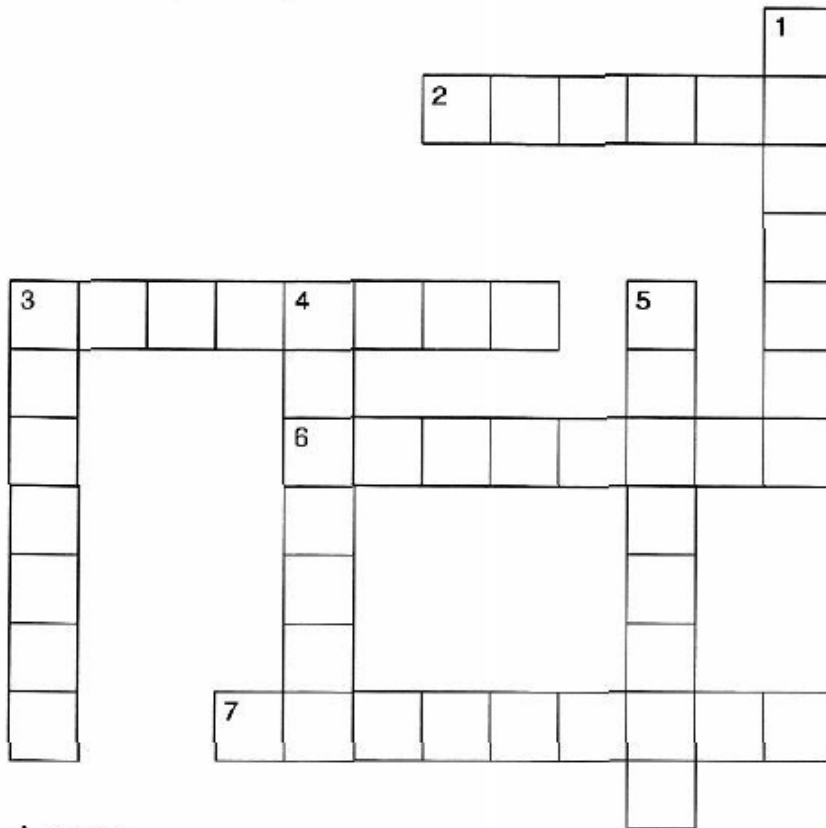
3 Complete these sentences with words from the box.

hyperlink log on graphics home page
server attachment inbox search engine

- a) When I turned on my computer I had five new e-mails in my _____.
- b) _____ can take up a lot of space. Some pictures can be as big as 10 Megabytes.
- c) If you want to go to the page about the cinema just click on the _____ and you'll go straight to the page.
- d) I didn't know any websites with information about inventors so I went to a _____ and typed in the word 'Inventors'.
- e) When you _____ to your computer you need to type in your password.
- f) When you create a website you must send all your pages to a _____ and that way other people can access your site.
- g) He has changed his _____. When you go to his site the first thing you see is a picture of his latest book and a menu list.
- h) He added the picture to the e-mail and sent it as an _____.

Computer technologies in scientific research

- 4 Complete this crossword with words associated with computers, the Internet and e-mail.



Across

- 2 working on the Internet
 3 computer programmes
 6 to make a note of a site address on your computer
 7 a site where people share information about a specific topic


Down

- 1 a group of computers linked to each other
 3 visiting various different sites on the Web
 4 where companies, individuals or organisations display information about themselves on the Net
 5 a site where you can write to people by e-mail in real time

Across

Computer technologies in scientific research

Listening & reading

- 2  You are going to listen to a radio debate concerning the greatest inventions of the past 200 years. Cover the tapescript and listen to the recording. Then check your answers to 1.

Interviewer: Good evening. Tonight we're debating whether the Internet was the greatest invention of the past two hundred years. On my left I have Sir Richard Hughes, who is head of Information Technology at London University, and alongside him Melissa Atwell, an IT expert and writer of several books on computer programming languages. On my right is Mark Daniels, a research scientist at Harvard and Pablo Perez, a well-known journalist and TV presenter.

Richard, I'd like to start with you. With so many great inventions to choose from, what makes you think the Internet was the most significant?

- 1 Which of these things were invented in the 20th century?

Car
Internet
Television
Telephone
Train



Richard: I think it is its impact on information. There's no doubt the telephone in the 19th century, and the television, in the 20th century, both had a massive effect on communication but the Internet empowered us all. The Internet means information for the masses. The television and the telephone are very much controlled by government and big business but the Internet was a kind of people's revolution. It meant that a large proportion of the population now has access to an infinite amount of information at the touch of a button. Not only that, but this information is worldwide.

Computer technologies in scientific research

Interviewer: Mark Daniels, would you like to counter that?

Mark: Ah, yeah, the Internet is significant but it wasn't until the 1990s that we really saw its effects. There have been other inventions that have had a greater effect on the way we live. The car, for example, invented in the 19th century, completely changed our way of living. We were able to move out of cities and we could travel with complete independence and look how it affected the environment we live in. Anyway, don't forget that the Net is dominated by English. If you don't speak English, its possibilities are a lot more limited.

Interviewer: Melissa Atwell have you anything to add?

Melissa: The car revolutionised transport or at least private transport. But don't forget we already had the train, people could get around before the car was invented. What

is remarkable about the impact of the Internet was that it affected so many things. It changed education, the way we run business, our access to information, global communications ... For example, I regularly have meetings with my bosses in the USA and we hold our meeting across the Net. This has made the need for travel redundant. That is what is so powerful. It has redefined so much of what we do, it has made many of the great inventions of the 19th and 20th century less significant ...

Pablo: ... I disagree with all the comments so far ...

Interviewer: Sorry, Pablo, did you want to say something?

Computer technologies in scientific research

Pablo: Yes, for me television has made the greatest impact. Since the early 1970s, you can go to the poorest of countries in the middle of Africa and you'll find TVs, but you won't find the Internet. The TV is everywhere and it has affected the whole way we view entertainment and our whole concept of society. It has helped shape our national identity more than anything else. It is a major source of political, social and economic information. It shapes fashion, our ideas and even our morals. Its effect on our concept of society is nothing less than phenomenal.

Richard: Yes, but it's not as simple as that ...


Listening & reading

- 1 Which of these things were invented in the 20th century?

Car
Internet
Television
Telephone
Train



Computer technologies in scientific research

3  Listen again. Which person do the following sentences refer to? Write RH (Sir Richard Hughes), MA (Melissa Atwell); MD (Mark Daniels) or PP (Pablo Perez).

- a) Argues that the Internet has reduced the importance of other inventions in the last 200 years?
- b) Believes that the car has not only had a massive impact on transport but also on the environment?
- c) Points out that the Internet is not owned and run by governments or private business?
- d) Maintains that the television has redefined society and influenced not only our thoughts but our morals as well?
- e) Makes the point that to use the Internet most effectively you should speak English?
- f) Stresses that the key issue is the information revolution and access to that information on a worldwide scale?
- g) Highlights the multi-faceted nature of the Internet revolution and that its impact is in all areas of life, such as business, communication and education?

4 Complete the phrases in *italics* with the correct preposition. Check your answers with the tapescript on page 44.

- a) I think it is its *impact* _____ information.
- b) ... *infinite* amount of information _____ *the touch of a button*.
- c) ... both *had a massive effect* _____ communication.
- d) *What is remarkable* _____ the impact of the Internet was ...
- e) It is *a major source* _____ political, social and economic information.

Computer technologies in scientific research

- 5 Complete the text with the phrases in *italics* and their dependent propositions in 4.

Another great invention, which really took off in the 20th century, was the camera. (a) _____ you can get an instant visual record. (b) _____ the camera is that it has hardly changed in nearly 200 years. The same basic technique is still valid today. Though the camera hasn't (c) _____ the way we live, it has changed the way we record the past. Cameras and the photos they produce are (d) _____ pleasure for millions of people around the world. What's more with the introduction of digital cameras their (e) _____ future generations is virtually guaranteed.

Writing

- 1 Some people argue that the Internet was the greatest invention of the 20th century. Look at the Listening & reading section and read the summaries of the points the experts made in 3.

What do you consider to be the greatest invention of the 20th century? Choose an invention and write three reasons why you think it is the greatest invention of the 20th century.

Invention _____

Reasons why

- 1 _____
- 2 _____
- 3 _____

Computer technologies in scientific research

Complete the text with discourse markers from the box.

for the first time but then prior to
not only in this sense it also meant that
but with as well as

- (a) _____ did the camera change the way we record history (b) _____ people from all walks of life could participate in creating historical documents for future generations.
- (c) _____ the invention of the camera nearly all visual recollections of the past were in the form of painting and drawings which tended to be commissioned by the nobility or for religion. There were far fewer documents of how normal life was lived. (d) _____ the introduction of the camera this all changed.
- (e) _____ people from all areas of life were able to document their lives.

Computer technologies in scientific research

References

Chamanlal M.J. Role of Computer Applications and Tools in the Scientific Research Process. *International Journal of Research in Science and Technology (IJRST)*. 2014. Vol. № 3, Issue V. October-December. P. 33 – 40.

Demeyer S. Research Methods in Computer Science. *IEEE 27th International Conference on Software Maintenance*. Williamsburg, 2011, ,USA, September 25-30, 2011. DOI: 10.1109/ICSM.2011.6080841

Singh A. Role of Computer in Research. *International Journal of Advanced Research in Computer Science and Software Engineering*. 2016. Vol. 6, Issue 5. P. 128–129.

Gibbs, Graham R.; Friese, Susanne & Mangabeira, Wilma C. (2002). The Use of New Technology in Qualitative Research. Introduction to Issue 3(2) of FQS [35 paragraphs]. *Forum Qualitative Sozialforschung / Forum: Qualitative Social Research*, 3(2), Art. 8, <http://nbn-resolving.de/urn:nbn:de:0114-fqs020287>.

Koch, Sabine C. & Zumbach, Jörg (2002). The Use of Video Analysis Software in Behavior Observation Research: Interaction Patterns in Task-oriented Small Groups [37 paragraphs]. *Forum Qualitative Sozialforschung / Forum: Qualitative Social Research*, 3(2), Art. 18; <http://nbn-resolving.de/urn:nbn:de:0114-fqs0202187>



**Thank you for
attention!**