

# Today and Tomorrow – Can ICT assist learning and living?

Enabling the  
information society



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# Today and Tomorrow – Can ICT assist learning and living?

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My apologies for not being with you in person

Consider current and future possible developments

- education, health and living

from the perspectives of

- students,

- the elderly,

- educational establishments,

- organisations

- governments.

- Consider legal and ethical issues

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# In this fast changing world of IT

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- Everyone is affected, from the ever increasing population of students and of elderly people
- Students need to understand technology and its use to address the needs of the elderly and disabled,
- In England from September 2014, the majority of schools introduced computer science for all pupils from 5 to 16 years as a compulsory subject.
- Online resources and support are provided by CAS (Computing at School), part of the professional body, BCS, The Chartered Institute for IT



# COMPUTING AT SCHOOL

EDUCATE · ENGAGE · ENCOURAGE

## CAS: part of BCS

- runs about 150 regional CAS Hubs, which support and monthly events for teachers
- **2600+ online resources provided free**

In the boat.  
Confident because  
can sail anywhere.  
(Where we are  
aiming for.)

Head below water.  
Not confident, can't  
even see there is a  
boat.  
(Where we were.)



Head above  
water.  
More confident as  
can see there is a  
boat to swim to.  
(Where we are.)



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# New Computer Science syllabuses for all ages

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- In primary schools, the students use Scratch language and in secondary schools the pupils use either Python or Java
- **Overseas interest** in these new computing syllabuses by countries including Sweden, Japan, US, Poland, Hungary, Belgium, Germany, Switzerland, Slovenia, Denmark, Estonia, Israel, New Zealand
- **South Korea** starting in 2017 as optional for primary and secondary schools
- **over 18,000 members of CAS**, throughout the world
- 85% of members are teachers,
- Others are IT professionals and academics
- **Join CAS** <http://community.computingatschool.org.uk/> for free

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## Current CAS Membership

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- *Global map* of members of CAS  
<http://community.computingschool.org.uk/users/map#3,48.18074893951126,-20.8749999999999986,1,0,0,0>
- **Join CAS**  
<http://community.computingschool.org.uk/>

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## Apprenticeships and Degrees

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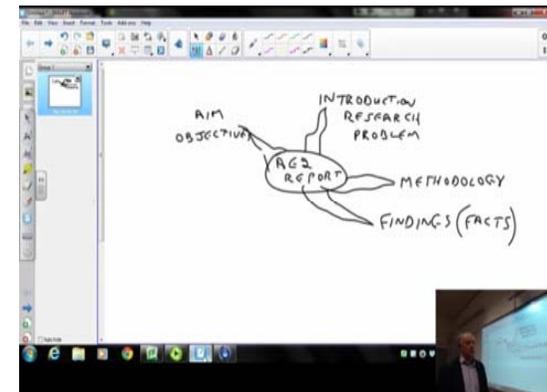
- At the age of 16, students are able to progress to A-levels or can undertake an IT apprenticeship with companies where they would gain practical experience, and a salary
- Choices at 18 include university degrees, some with a one full year in industry, prior to the final year and often with industry based projects
- Alternatively from 18, a form of higher apprenticeship is possible so gaining practical experience, studying subjects leading towards a degree of relevance to their employers, who provide a salary and pay for their tuition



# Using Technology as Part of Learning

Many courses now use a blended approach

- Activity Based Learning, having Internet based such as via Moodle
- Lectures captured directly through systems such as Panopto, so students can replay sections that they had problems understanding, useful for students whose first language is not English or those with particularly learning, hearing or sight disabilities
- Hand-held devices or their own mobile-phones are used so all can respond to multi-choice questions, so lecturers can assess them



# Using Technology to Raise Students' Awareness of the Elderly

- Students given practical experience of problems relating to sight, hearing and mobility, by them experiencing these problems themselves
- Students put on "ageing suits" which restrict their movements, ranging from the ability to sit comfortably, rise from a chair, walk, reach high or low objects, to open containers and use a keyboard
- By using specialist glasses, other sight problems can be experienced, from those with diabetes to cataract
- By wearing special gloves, connected to a battery, uncontrolled shaking of their hands can be experienced



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## Aging in Minutes

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- Students on various courses, from computing, fashion, marketing, construction, interior and exterior design, including the design of packaging are given an opportunity to experience this aging in minutes.
- Students are encouraged to consider the aged and disabled in their projects
- Experiences have been arranged by BCS events, such as “Don’t Put Your Granny in a Bean bag” so enables these activities to be open to the general public



# Raising awareness of the physical requirements of the elderly and disabled

- With the worldwide increasing elderly population there is a need and a market for elderly and disabled friendly articles
- This should increase the well-being, both physically and mentally of this ever-increasing sector of the world population
- These ageing suits and other equipment are used at some hospitals in training courses for nurses, doctors, porters and clerical staff to understand the problems of the elderly and disabled



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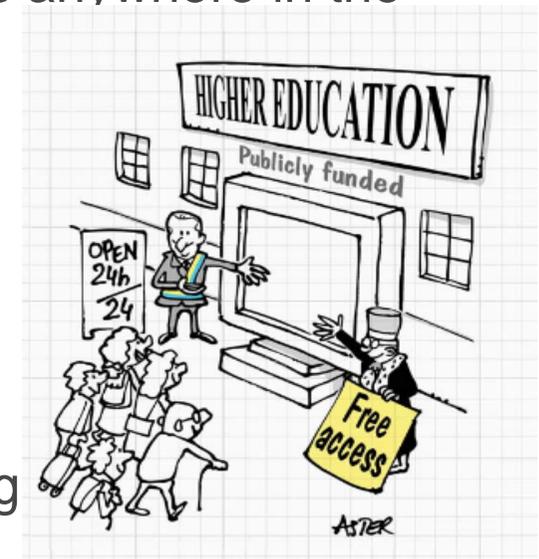
## Use of Body Scanners and 3D Printers

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- These could provide in the future, clothes at low cost, personalised for the individual elderly or disabled person to fit their changing body shapes, whereas commercially marketed clothes are designed to expect the population to stand "up straight"
- These individually constructed clothes, would allow the wearer both to look and feel smart and comfortable, and should encourage a more positive approach to ageing

# Growth in Various Types of Universities of the Third Age

- These often provide courses and one-off lectures, usually led by volunteers, at the cost for attendees of only the refreshments and room hire
- These provide both mental stimulation and social interaction
- The former is provided also by games, such as Scrabble, which can be played individually or through the Internet with players anywhere in the world, possibly having met on-line
- Encouraging mental agility can be by remote on-line study
- Many retired people who have undertaken these courses, such as those run by the Open University in the UK, have obtained new skills and develop their hobbies in greater depth, and in some cases obtaining degrees



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## E-learning and How this could Help the Ageing Population

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- MOOCs (Massive Open Online Courses)
- Other elderly people have followed MOOCs (related to their interests), often provided by universities in various parts of the world
- These are usually free but with mainly peer support and only limited tutor assistance
- Interviews with some of these elderly MOOC users, included comments such as:
  - It assumed too much pre-knowledge,
  - It over-simplified certain topics so I did not learn anything new,
  - It was easy to pass the self-assessment tests, by just checking back on the material,
  - I had technical problems with slow or missing Internet connections.
- The majority of the elderly interviewees did not feel any positive social interaction through these courses

# E-Learning and Third World Countries

- MOOCs, by allowing self-study, can be used as part of preparations for professional qualifications, such as those of the professional bodies such as the BCS
- These can be taken at various global locations, and many are online multi-choice, internet based and are equivalent to the first or second year of a degree course
- Various charities, such as MOOCs Africa and TULSA, have been established to assist learning for children and adults, especially women, in rural Africa



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## E-Learning and Third World Countries

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- Local schools and colleges can use these MOOCs as part of their teaching, and, by following a selection of relevant MOOCs, learners can be prepared for globally recognised professional examinations
- The tutors could provide extra material if required, and could run short one or two day sessions, utilising buildings on days when these are not in use



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## E-Learning and Third World Countries

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- The increasing use of mobile phones in Africa provides an ideal base for using MOOCs
- This provides a further opportunity for the elderly, with the relevant skills, to assist with MOOCs support to others, possibly in Africa
- By doing this, it promotes their own mental well-being
- MOOCs are also being developed to increase the understanding of basic health care, prevention of disease including HIV, and issues such as pregnancy, particularly for women in Africa.

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## Medicine and Technology

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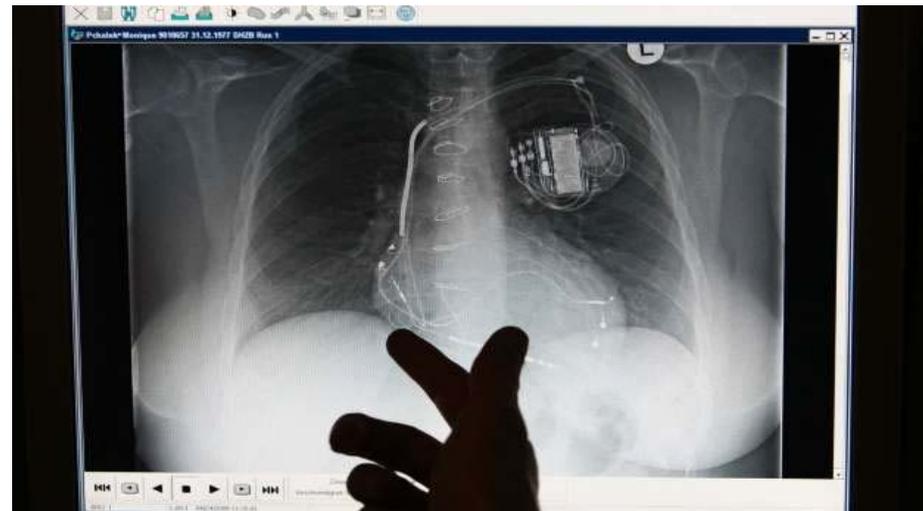
- Technology is being used to scan patients, then using 3D printing to produce a model of the damaged body part, such as a hip joint or showing the position of a kidney stone
- These have been used to explain to the patient the nature of the problem, and aid discussion of the various treatment options
- This is particularly useful with complex operations, allowing the surgeon to pre-plan the operation in greater depth, so reducing the time in one case from 10 to 7 hours which then also reduced the cost of the operation and risk to the patient

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## Medicine and Technology

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- Embedded chips in the body have been used for a number of years for humans as well as pets - now in England dogs are legally required to have an embedded ID chip
- Embedded chips can be implanted to monitor and administer medication as with pregnant women and diabetics
- It was reported that US Vice President Dick Cheney was not allowed by the US security services, to have a remote heart transplant monitoring system in case it was remotely hacked



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## Current and Future Use of Embedded Chips

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- Patients with dementia could be identified if found in a confused state with a "passive" embedded chip
- With the increasing power and reduced size of batteries, an "active" embedded chip could identify quickly a missing sufferer of dementia
- These are currently used to track pets, with a chip fixed to the pet's collar so the location, linked with GPS, is sent directly to the owner via an App on the owner's mobile phone
- The concept of embedding such "active" chips in the body raises ethical issues, especially if extended to locate missing children

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## Risks and Ethical Issues

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- For adults, a "living will" would be needed in preparation for the possibility of becoming a sufferer of dementia
- Risks exist with the embedded chips of
  - hacking,
  - computer viruses,
  - remote interference,
  - battery life,
  - confidentiality of the person's data, as in today's world data is more widely "joined-up"
- These must be balanced against the health and safety benefits of embedded chips



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## Robots and the Aged Population

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Robotic suits to aid walking and to replace wheelchairs

Robots for health assistance in hospitals, care home and at home, assisting

- lifting from beds, chairs etc
- dressing
- personal hygiene
- Reporting back to “control” and abnormalities, maybe with photos and live feed

But would this be acceptable to the “patient”?

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## Robotic Animal Helpers

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Proven positive results of interaction of patients with live four-legged “official” hospital visitors, but consider:

- Remote live four-legged “official” hospital visitors
- Replace the real animals with robotic animals
- Replace real assist “seeing” and “hearing” animals with robotic “animals”, which could
  - summon help quickly
  - clarify the situation,
  - provide live feeds
- Would this be acceptable? Would you need a “living will”?

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## Robotic Carers

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- Robots could replace, in part, the visiting human carer, in their roles of distributing and ensuring medication is taken
- Robots could report back to "control" if they do not "see" the medicine being swallowed - Is this acceptable?
- The robot could help their "patient" with washing, assisting them with dressing and undressing, as well as the very personal role of helping them in the toilet, and reporting back on changes - Is this acceptable?
- The carers in the UK, provided by the local authority, now have been asked, in many cases, to reduce their visits to fifteen minutes or thirty minutes per visit, whereas the robot would be available 24x7 for the patient

# Robot Carers

- Elderly independent livers are often delivered cooked meals, often by volunteers, to their homes, but with very limited choice of timing or menu
- Robots could provide freshly prepared meals on demand, and assist the "patient" to eat, and also recording any problem or abnormal eating behaviour - Is this acceptable?
- By using these robots, the human visitor need not be a highly trained carer but could possibly be provided by links to local colleges or charities
- Additional human social interaction could be provided via the Internet, with human friends who might be globally separated



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## Robotic Nannies and Carers

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- Robots used as a nanny with the care of children, and those with some mental disabilities, is even more of an ethical dilemma,
- Possible legal implications for
  - the parents and guardians
  - the monitoring “control” centre
  - the developers of the robots and its software
- In these cases, there is no opportunity for a “living will”



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## Conclusion

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- With the increasing availability of e-learning, via colleges or as self-study, e-learning can now be used to "up skill" throughout the whole career and during retirement
- It can be accessed easily through mobile phones and other technology throughout the world, personalised for individuals, and at times that are convenient for the user
- This use of lifelong e-learning could enhance the mental capacity of all, including the elderly
- This could also help to address the issues of dementia, providing an option to mentally stimulate the elderly, those with learning difficulty and also those separated from other regular human contact
- These e-learning opportunities can now be provided in a form suitable for all, especially those with disabilities, including the blind and the deaf

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## Conclusion

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- Students of today need to understand both the current and future applications of technology, but also the ethical decisions, which could be more difficult to solve than the technical problems
- The current and future technology offers wonderful potential to assist all, regardless of age, ability and location, but, as with all good things, there is a possible "down side".
- In this case, rather than issues of cost, the ethical issues could be a need for consideration now and in the future

# Thank you for your patience

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Cartoons from

**“High Level Group on the Modernisation of Higher Education”**

Report to the European Commission on New Modes of Learning and  
Teaching in Higher Education, October 2014

[http://ec.europa.eu/education/library/reports/modernisation-universities\\_en.pdf](http://ec.europa.eu/education/library/reports/modernisation-universities_en.pdf)

and

**“Improving the Quality of Teaching and Learning in Europe’s  
Higher Education Institutions”**

[http://ec.europa.eu/education/library/reports/modernisation\\_en.pdf](http://ec.europa.eu/education/library/reports/modernisation_en.pdf)