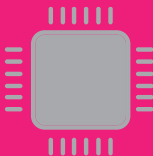


MANCHESTER
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The University of Manchester



GIRLS INTO COMPUTING

TOP TIPS FOR SCHOOLS



COMPUTING AT SCHOOL
EDUCATE · ENGAGE · ENCOURAGE
Part of BCS, The Chartered Institute for IT

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“When I was at school, I didn't really expect to be studying science. It was only really when I put other people's perceptions aside, and thought about what I really wanted to do, that I ended up moving in this direction and ultimately having a career in computing, which I've found really rewarding.”

Dr Caroline Jay
The University of Manchester



“Don't let anybody tell you
can't do it just because
you are girl.”

Osnat Katz from Robogals

INTRODUCTION

Computing is for all: women and men, girls and boys. It is a world-changing and life-changing technology, so it is important that all are involved in its development.

Schools have a crucial role. If you need help engaging girls with computing in your school, here are some simple tips for you. With these, you can make a difference and do something important about gender balance in this subject.

These tips have been tested in schools and shown to be effective – some schools now have more girls than boys taking computing qualifications. Choose those that fit with your teaching and your school. Do let us know how you get on.

Good luck!

Computing At School
School of Computer Science
The University of Manchester



TIP 1 WOMEN CAN CHANGE THE WORLD

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Make links to the big picture and real-world computing roles which have an ethical remit and work for the good of society, for example designing assistive technologies to enable people to overcome a disability. Other areas might include medicine, humanitarian work, science, fashion, communications, art, journalism or sport.

Ask

"What type of people work in computing, and what do they do?"

“A high quality computing education equips pupils to use computational thinking and creativity to understand and change the world.”

National Curriculum Programme
of Study for England

Discuss the strengths and skills that pupils have and explore the sorts of computing roles that suit their skill sets. Explain that many people who work in computing are actually undertaking highly creative work.

Why is this important?

Mainstream media representations of people working in computing are largely white males writing computer code. It is important to provide a more realistic, balanced and aspirational viewpoint.



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“I am very happy to learn computer programming because, most of the time, women are regarded as inferiors in computing. I hope that one day I will become a female computer programmer in my country, Malawi, and nothing will ever prevent me from doing it.”

Schoolgirl
Bandawe Girls School, Malawi



“Ensure that Primary, or even younger, children see girls doing STEM subjects as a normal part of life.”

Professor Danielle George
The University of Manchester

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Ask

What image comes to mind when you think about the term 'geek'?

Discuss media portrayals of people who work in scientific, engineering or technical disciplines – contrast this with real world examples. How might people who are creative, logical and knowledgeable use their skills to benefit themselves and their society?

Use displays and role models that promote the diversity of people who work in computing. Ask role models from the computing industry to give talks at your school.

Explain that girls typically do very well in the subject when it comes to qualification grades.

Why is this important?

Many young women do not identify scientific, engineering or technical disciplines as interesting, relevant or appropriate for their gender, yet have the aptitudes and skills to be successful, happy and to make a difference in these domains.

TIP 2 ROLE MODELS

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“Have some displays of women who are successful in the world of technology and computing – women that girls can relate to and are not outdated.”

Zoe Ross
Social enterprise entrepreneur



TIP 3 OUT AND ABOUT

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Plan trips that give girls the big picture and real-world contexts that will help girls see how computing is useful.

Examples might include:

- The BBC
- Local museums of science and industry
- Bletchley Park
- Jodrell Bank
- Cadbury World
- National Media Museum
- Visits to companies e.g. Barclays Digital Labs
- Local universities and employers may provide special educational activities for girls.

Why is this important?

School trips provide valuable real world contexts to attract girls into computing. They often lead to an exploration of female role models working in computing and STEM subjects.



“Arrange trips to places of interest where girls can see computing in action and the impact it is having, or has already had, in the world.”

Pete Marshman
Secondary Teacher

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TIP 4 MENTORING

Use mentoring to support and encourage girls into computing. Mentors may be older girls or female teachers.

Look for opportunities to have industry experts work alongside girls on specific projects.

Why is this important?

Two important steps in persuading girls to choose computing are helping them to recognise that the subject is “for them”, and ensuring they feel safe and can learn in an often male-dominated working environment. Mentors are both role models and support mechanisms that enable girls to overcome these concerns.

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“When the Year 12 girls worked with us they gave me lots of help and gave me confidence to try things for myself.”

Year 9 pupil
The Birkenhead Park School



TIP 5 GET PARENTS ON SIDE

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Parents can play a pivotal role in encouraging or discouraging girls to consider studying computing. It is therefore important that parents understand the breadth of the subject and the career opportunities it offers. Strategies which can help include:

- Providing a broad range of appropriate qualifications linked to employment examples.
- Information about possible careers via wall displays, information evenings, talks from companies and the school website.

- Specific events to help parents understand aspects of the subject, such as “E-safety for your family”.
- **Encourage parental support** – Generate local news stories based on achievements in computing, for example entering teams in competitions such as Robocup Challenge Junior, Apps for Good, CyberFirst and The UK Schools Animation Competition.
- Ask parents with computing expertise to give talks at the school.
- Make the outcomes of computing visible, e.g. through wall displays and physical objects such as robots and 3D printed models.
- Ask previous pupils who are working in computing or studying the subject to tell their story at information and awards evenings.

Why is this important?

Parents provide the framework within which girls make decisions about their study choices. They also can be a catalyst for driving demand for computing qualifications to be offered by the school.



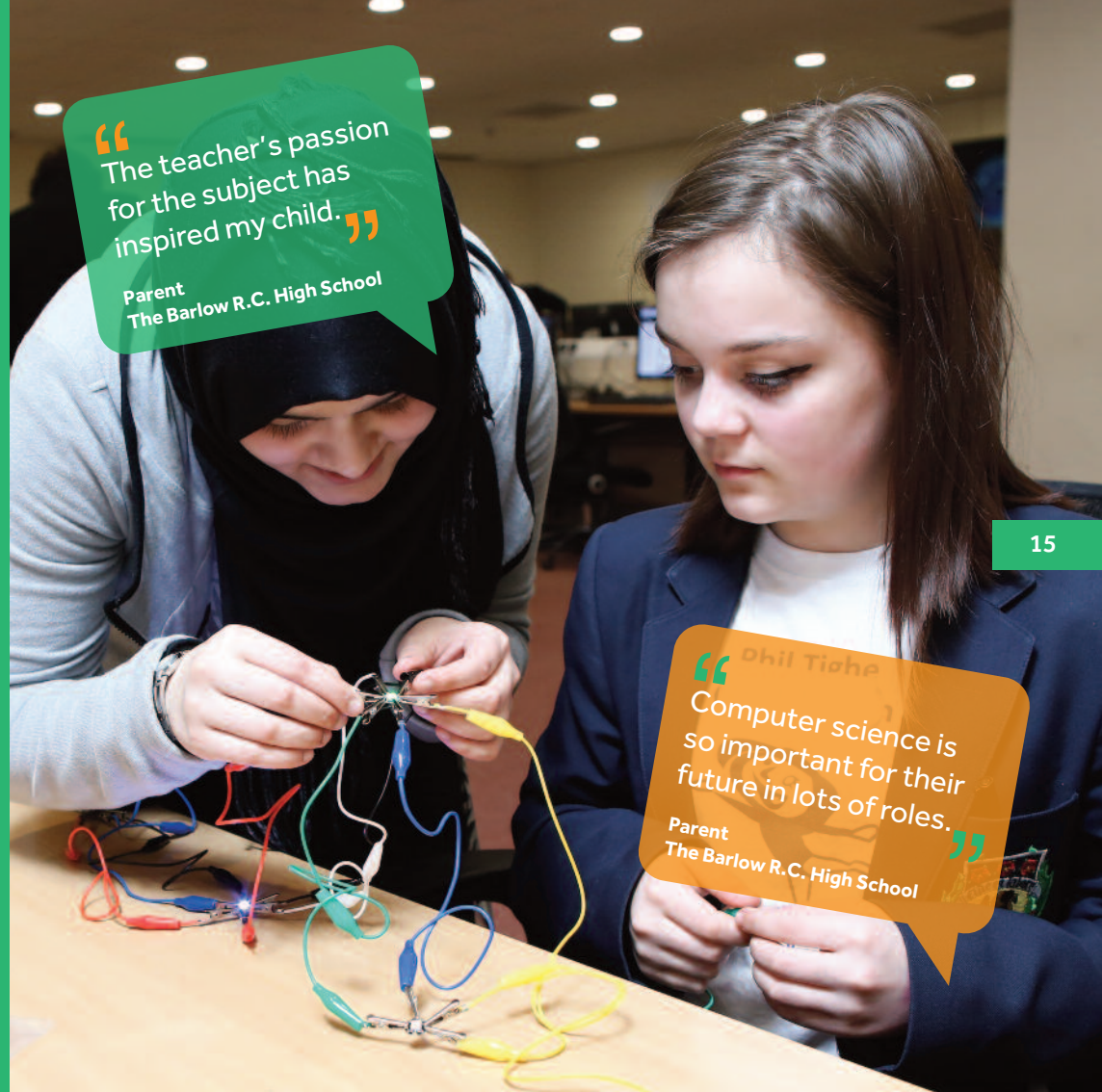
“
The teacher's passion
for the subject has
inspired my child.”

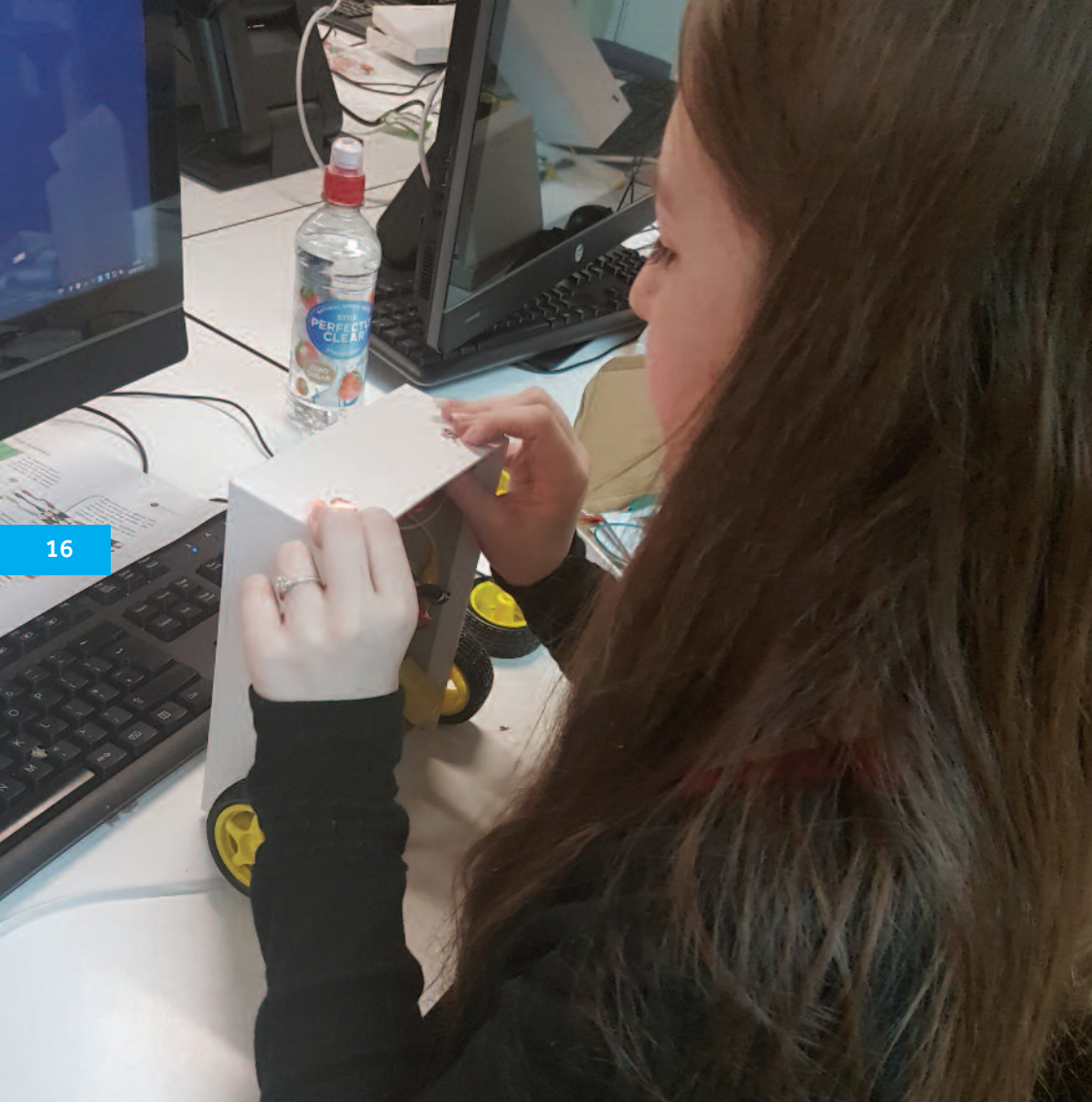
Parent
The Barlow R.C. High School

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“
Phil Tishe
Computer science is
so important for their
future in lots of roles.”

Parent
The Barlow R.C. High School





“When recruiting for clubs, don't ask if they would like to join an IT club. Ask the girls if they'd like to come and mix music, create wearables or produce websites.”

Jamie Chadwick
Secondary Teacher

TIP 6 COMPUTING CLUBS FOR ALL

Computing clubs can quickly become male-dominated, so think carefully about how they can be made relevant and welcoming to girls.

Encourage pupils not only to attend clubs but also to be involved in the creation of clubs.

Why is this important?

Computer clubs provide valuable time for pupils to follow their own interests and passions in computing. When clubs are monopolised by boys, girls are less likely to join them.



TIP 7 THE FIRST LESSON IS CRUCIAL

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Make a conscious effort right from the start to include everybody in the lesson. Think about the early topics and ask will they suit everyone?

Try to make a proper introductory lesson. Ensure that the content of this lesson appeals to all and shows that computing can be exciting and creative, has real benefits for society, and offers great and worthwhile careers.

Why is this important?

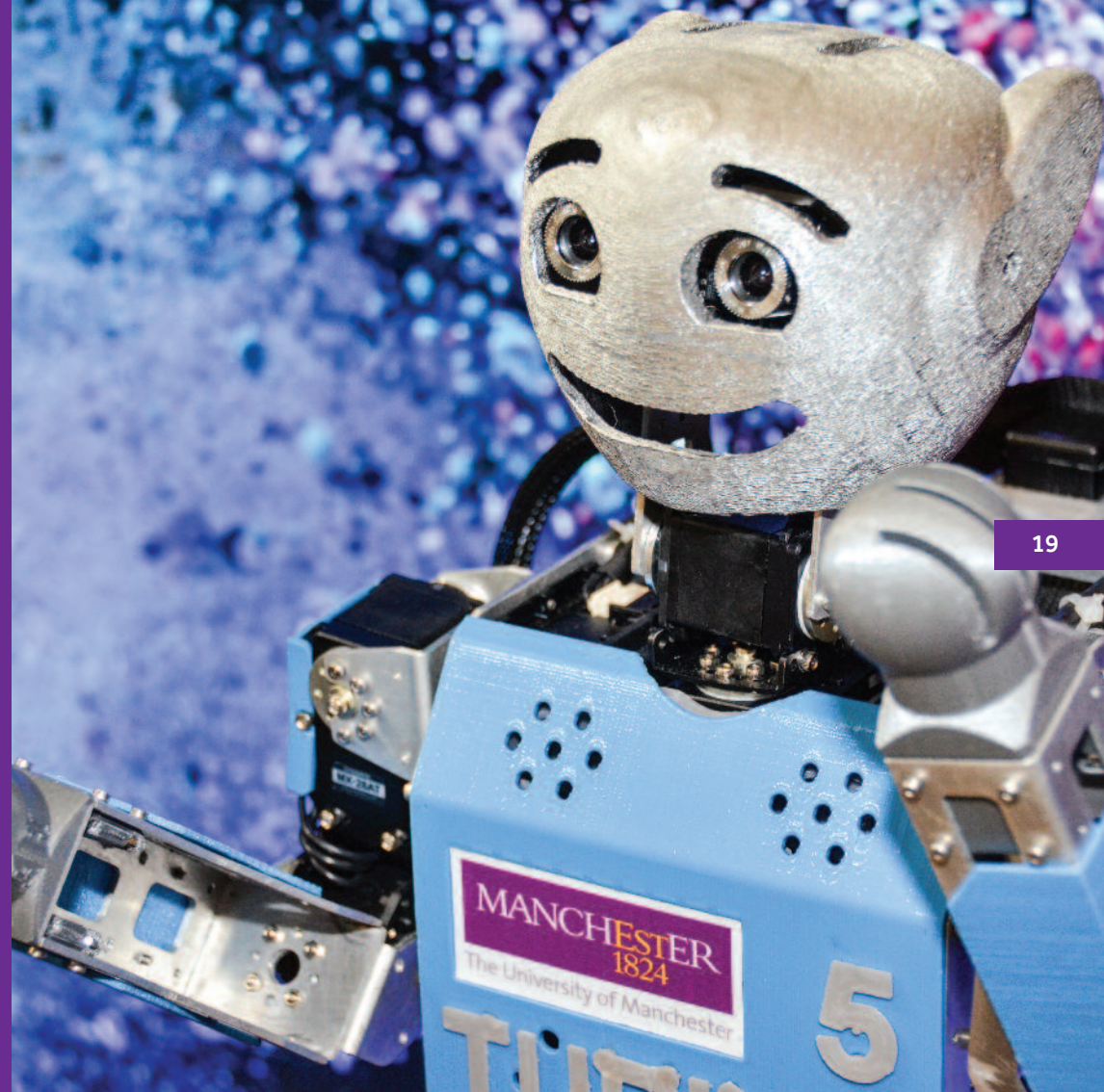
There are so many preconceptions about what computing is and who can prosper in the subject. It is important to dispel these in the first lesson. The first lesson should be inspiring to all, and something that all find exciting and can engage with. For some school students, this first lesson may be the only chance ever to inspire them to study computing.

“
One of my best lessons was
in Year 9, when my teacher
borrowed a robot from the
university. When we walked
into the classroom the robot
was doing a dance.”

Year 11 girl
Urmston Grammar School



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Ensure that praise addresses all aspects of learning including creative solutions, planning and conceptual understanding, as well as specific technical knowledge and skills. Praise needs to be meaningful and worthwhile. Alongside this, it is important to consider who you are praising and for what.

Why is this important?

When used effectively, praise and encouragement can motivate pupils and help to build a positive learning environment. By using specific targeted praise, pupils will be motivated to learn and participate in lessons.

TIP 8 ENCOURAGE AND PRAISE

“Consider whose work and contributions you praise. Ensure girls as well as boys are rewarded. Create a gender mix and so remove stereotypes.”

Ahmad Jalloh
Secondary Teacher



TIP 9 KEEP IT REAL

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Always seek to address the question
“**Why are we learning this?**”.

Computing enables individuals to use powerful tools to affect the the real world. Telling these “stories” helps girls make links between classroom learning and their aspirations. Find out what the girls in your lessons are interested in, and use these topics to provide context to your teaching.

For example you might teach:

- How modelling can be used to track and control disease outbreaks.
- How social media, ubiquitous technology or artificial intelligence are changing the world.
- How computing enables artists to produce work that would be otherwise impossible.
- How computing heroines have played a major part in computing in e.g. medicine, space exploration and code breaking.
- How to bring together several technologies to make something amazing e.g. wearables.
- The broad range of career paths which open up when you study computing.

Why is this important?

Abstract computing concepts can be perceived as irrelevant (or too difficult) by some students. Placing them in a real world context can bring these ideas to life and render them more understandable.



“ I believe it is incredibly important to send out this message to children who are making their first steps on a computer and learning how to program – either for leisure or as part of a computing class in school. It's not about learning how to write lines of program code; it's about the amazing things you can do by writing code. ”

Samantha Bail
Graduate, The University of Manchester
Now working in oncology in Manhattan

“ Look at what the girls are already interested in and link computing to it. ”

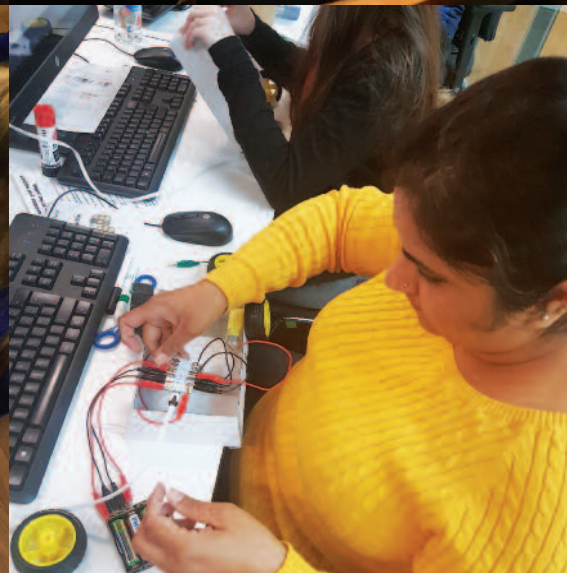
Donna Rawling
CAS Master Teacher

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Computing provides the opportunity to offer many choices, both in what pupils use and in what they will produce. You could give choice over:

- Creative ideas e.g. the interface of an app or the story of an adventure game.
- The software they could use to solve a problem.
- The product they'll create, e.g. instead of a written report they could produce a video or screencast.
- The roles they will take in a team project.

Why is this important?

Giving pupils a choice motivates learning and gives a sense of purpose, ownership and control.

TIP 10 PROVIDE CHOICE

“Computing is not **ONE** thing, it's **MANY** things. There are lots of different areas you can get involved in.”

Caroline Jay
The University of Manchester

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TIP 11 UNPLUG

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“Plan for the development of unplugged activities to allow for freedom of expression and context. Build confidence!”

Carol Murray
CAS Master Teacher

Plan to spend time away from the keyboards – use a mixture of unplugged and planning activities as well as building digital skills. When possible, change the learning environment and encourage movement and the use of space. For example you could:

- Build a binary calculator from paper logic gates in the sports hall.
- Explore algorithms in an outside space.
- Visit other subject areas to explore computing in these areas.
- Use activities such as dances and games to add fun and get away from keyboards and screens.

Why is this important?

Problem solving often involves moving away from the computer to understand the broad concepts, plan next steps and work with others.



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TIP 12 COLLABORATE

In any project, ensure that there's a balance between individual and group activities. Think about whether group members should have specific roles which mirror those in real world computing teams.

When planning group activities think about how online collaborative tools can support groupwork. For example:

- Working together on shared documents.
- Developing collaborative mind-maps.
- Designing an online quiz together.

Why is this important?

Group work teaches valuable social skills, enables peer learning and demonstrates that working in computing is seldom a solo activity. Typically, computing projects are undertaken by multidisciplinary teams. Allocating roles can help students identify and build upon their strengths.

“Programming in pairs has helped me understand much more. I like coming up with my own ideas for improving my program.”

Year 8 girl
Manchester Communication Academy



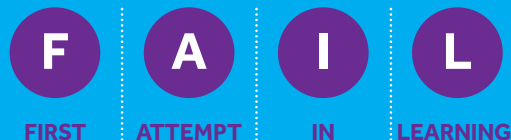
TIP 13 NEVER GIVE UP!

“Don't let anyone put you off. Do what you enjoy doing and you will do well at it.”

Professor Philippa Browning
The University of Manchester

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Build confidence by creating an environment where experimentation and failure is celebrated and encouraged. A helpful acronym which encapsulates that learning does not happen without “**failure**” is:



Why is this important?

Often our school system rewards a “right” answer, when real world success is always built upon multiple failed attempts. This is particularly evident in computing, for example where developers spend as much time debugging code as they do creating new programs.



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“Don't let anyone tell you that anything is impossible.”

Professor Louise Walker
The University of Manchester



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