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bbsrc.ac.uk

Using trump cards in school engagement and outreach

Trump cards is a popular children's game that encourages factual learning and numeracy. The cards present a great way for children to learn about areas of science and to be introduced to research topics.

Suitable for Key Stage:

1 2 3 4 5

20 YEARS OF PIONEERING GREAT BRITISH BIOSCIENCE
BBSRC 1994 - 2014

Trump Cards

Teacher

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View online

Scan the QR Code.

Introduction

Teacher

The Biotechnology and Biological Sciences Research Council (BBSRC), BBSRC-funded institutes and a number of educational organisations have developed packs of scientific trump cards based on the popular Top Trumps® game. This guide will help you to use them effectively when doing outreach activities or lessons and provides a few ideas for novel ways to get the most out of a pack of trump cards with a class of pupils.

The guide will be useful for scientists who would like to use trump cards as part of their outreach or school engagement activities. Teachers may also find this guide useful to maximise the teaching potential of a pack of trump cards.

A game of trump cards is traditionally played between two people so in order to use them with bigger groups of people or in different formats and settings, a degree of innovative thinking is required.

But how many different ways can we use them? The only limit is our imagination. This guide will simply provide a few examples to get you thinking more creatively.

The ideas in this guide have come from the BBSRC Inspiring Young Science Coordinators, BBSRC School Regional Champions, and teachers who have used them in class and at science exhibitions.

You can make your own trump cards on almost any topic you can think of. Alternatively, there are plenty of trump cards already available to buy or simply download and print out.

What are Top Trumps®?

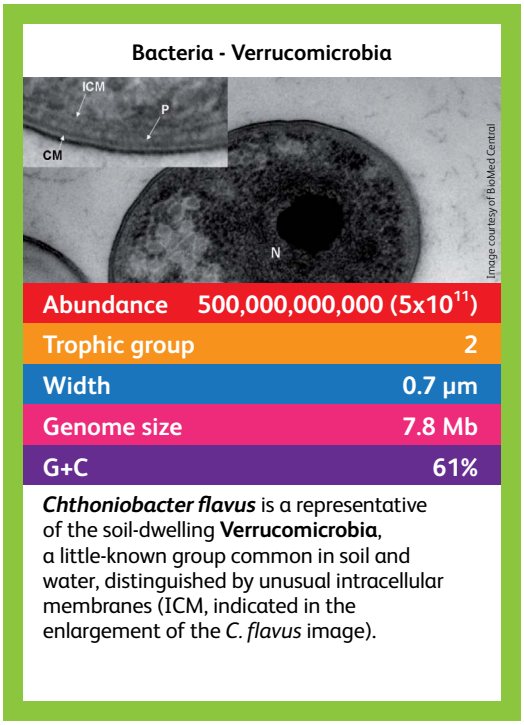
Teacher

Top Trumps® is a card game traditionally played between two or more people. Each card lists numerical data that players compare with the aim of 'trumping' their opponent by having a greater value. The winner gains the opponents card(s) with the game continuing until only one player holds all the cards.

Each card in a pack has the same categories. For example the Journey to the Centre of the Earth soil organism cards have five categories:

- Abundance
- Trophic group
- Width
- Genome size
- G+C

These cards also feature some additional information about the bacteria.



Top Trumps Card

The pros and cons of using trump cards

Pros

- Factual
- Educational
- Simple concept and easy to play
- Enhances numeracy
- Caters to different types of learners
- Competitive
- Familiar to many young people
- Familiar to many adults

Cons

- Requires at least one card for each individual in the group
- To run as a two-player game requires many packs
- Competitive
- May seem dated

BBSRC Trump cards

Teacher

Trump cards have previously been produced on soil microorganisms to accompany Journey to the Centre of the Earth and the Darwin Today exhibition, as well as by The Genome Analysis Centre (TGAC) on crop genetics. A pack of Slug Trumps were produced to help identify native and foreign slugs as part of a citizen science project, and BBSRC researchers and School Regional Champions have produced packs on super-pests, parasites, world diseases, immunology and algae.

Top Trumps Cards

Other Science-Related Trump Cards

Teacher

Top Trumps® themselves produce a number of packs of cards that can be used to teach science and these include dinosaurs, creatures of the deep, deadliest predators, bugs, horses and ponies, and even breeds of dog. The Natural Environment Research Council (NERC) and the Economic and Social Research Council (ESRC) funded scientists from the Universities of East Anglia, Plymouth and Oxford – partnered with Winning Moves Ltd., the official designers of Top Trumps® – to develop a special limited edition set of volcanoes trump cards
www.volcanoestoptrumps.org

The trumps game Plants, drugs and medicines was produced as a result of a Science and Plants for Schools (SAPS) associate award
www.saps.org.uk/awards/1230

Centre of the Cell have produced bacteria, virus and cell trump cards
www.centreofthecell.org/centre/?page_id=226

MicroTrumps is a microbial card game featuring 28 A6-sized cards – two each of 14 organisms available to buy from the Chilled Food Association.

They are illustrated with an electron micrograph and Nanobugs character, along with technical data and general information on each organism and their effects on humans, together with a 'dangerousness' score.

Chemistry and materials are popular topics for trump cards. There is Dr Hal's Chemistry Trumps
www.drhal.co.uk/shop/index.php?main_page=product_info&cPath=&products_id=3

and with funding from the Engineering and Physical Sciences Research Council (EPSRC) the University of Liverpool has produced Materials trumps which also feature an online version of the game
classroom.materials.ac.uk/card.php

and the Royal Society of Chemistry have produced Visual Elements trump cards
www.rsc.org/shop/books/2008/9781847559005.asp

The University of Manchester's Dalton Nuclear Institute have produced an energy database card game with cards covering a range of different energy options, including fossil fuels, nuclear energy and renewable energy sources
www.dalton.manchester.ac.uk/connect/learn

A set of 26 fungus trump cards are available to download as a PDF from the Woodland Trust
www.naturedetectives.org.uk/download/trumps_fungi.html

Make Your Own Trump Cards

Teacher

How to produce a good set of trump cards – some tips

If you want to make you own trump cards, the Science Museum provides a template.

How to produce a good set of trump cards – some tips.

1. Choose a topic that you will be able to produce enough cards on. Ideally over 20 different cards.
2. Make sure you have enough categories. At least six categories is ideal.
3. Choose categories that have numerical values.
4. Choose a reliable source of data and reference it.
5. Ensure the characteristics you choose have a suitable range and variety of values. For example, number of legs might be a good choice whereas number of eyes would be a poor choice.
6. Ensure you use images with the appropriate copyright and attribution.
7. Keep the additional information succinct and easy to understand.
8. Make the cards the normal card size (remember children have small hands). You can do this by using our template.

How To Play

Teacher

Rules

1. The cards are shuffled and dealt out among the players face down. Traditionally players do not look at their cards or rearrange their order.
2. Players may only look at the top card in their own pile.
3. The player to the left of the dealer will choose a category from their top card and read out the value.
4. All the other players will then read out their values for the same category on their top card.
5. The player with the best value* wins the round and receives everyone else's top card. *This is usually the largest figure, but not always. The instructions should indicate whether a higher or lower value is 'better'.
6. The winner places the cards they receive at the bottom of their hand and then chooses the category for the next round.
7. If there is a draw and two or more cards have the same value, all the top cards are placed in the centre and a new category is chosen by the same player. The winner of this round gets the top cards as usual plus the ones in the centre.
8. Players are eliminated when they lose their last card.
9. The winner is the player who ends up with all the cards.

Alternative ways to use trump cards

A pack of trump cards can be used in various ways when working with groups of young people and come in handy with a class you don't know. Make sure you have enough cards for at least one card per member of a group or class. You can easily vary the complexities of the tasks you assign to the students based on their ability and understanding. Some of the classifications, answers or conclusions the pupils reach can in themselves prove interesting allowing you to assess their knowledge and hold discussions or debates. For instance which is the tallest organism and how would you go about deciding? How good are the pupils with unit conversion, decimal places etc.?

On the following pages you will find some Trump Tips in a handy card-sized format for you to print and keep with your trump cards.

The ways to use trump cards are grouped into four types of activities:

- Organisation – using the cards to assign groups or to pick students at random
- Ordering – to get students to organise themselves according to the data on their card
- Learning – ideas for more in-depth activities
- Smaller groups/multiple packs – ideas for activities when you have more than one card per pupil

Trump Tips

Teacher

Organisation

Ask pupils to organise themselves into groups using the cards e.g. if using the Darwin trump cards, pupils can divide themselves into two groups: unicellular and multicellular.

Organisation

Pick pupils based on their cards. If you do not know who has which card this makes your choice of student random e.g. "Could the person with the zebrafish answer the next question?"

Organisation

Split the class into two groups, by choosing a category yourself and having pairs of pupils playing each other, with the highest value (winners in the traditional game) forming one group and the lower value (losers) forming the other group.

Organisation

Split the class into two groups without competition by separating ones holding certain cards e.g. with the Darwin trumps, using the chromosome number category: one group holding a card with 24 chromosomes or less and another group of those with 25 chromosomes or more.

Organisation

Have a quick mini-league, starting in pairs, with winners proceeding to a second round and so on, all the way to a final.

Ordering

Ask pupils to organise themselves into a range of values from high to low e.g. based on the genome size on their card. This will require students to confer with each other to work out the correct order.

Trump Tips

Teacher

Organisation	Organisation	Organisation
		

Ordering	Organisation	Organisation
		

Trump Tips

Teacher

BBSRC Learning

Use the information on the cards to create a competition or quiz and assess learning e.g. what is a trophic group?

BBSRC Learning

Stimulate debate by asking questions or setting tasks that may not have clear answers e.g. “everyone who has something they have eaten on their card stand at the back of the room”.

BBSRC Learning

Using the Darwin trumps to explore trophic levels with pupils e.g. assign each corner of the room to primary producers, herbivores, predators and apex predators and ask the pupils to go to their respective corner.

BBSRC Learning

Using the Darwin trumps, have the class organise themselves into taxonomic classifications e.g. vertebrates, unicellular organisms etc.

BBSRC Learning

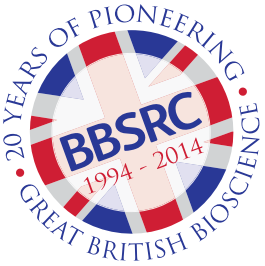
Using a large poster or sheet of A1 paper with an evolutionary tree, have the class place their cards where they think they would go.

BBSRC Learning

Provide the pupils with the cards prior to the lesson and instruct them to research their organism then hold a specialist round of Mastermind on their subject card.

Trump Tips

Teacher

Learning	Learning	Learning
		
Learning	**Learning**	**Learning**
		

Trump Tips

Teacher

Learning

Discuss information that is not on the card e.g. which is the tallest organism and how would you go about finding out?

Learning

Use the information on the cards to look at converting units or decimal places e.g. what is 7µm in mm?

Learning

Use the data on the cards to create graphs or charts or look for correlations.

Learning

Pupils can play the game 'Who am I?' in pairs, small groups or with the whole class. Extend the game by playing according to matching characteristics.

Multiple cards

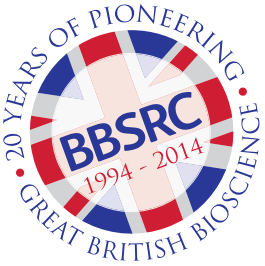
Matching pairs – Combine two packs of cards, shuffle and lay face down in a grid pattern. Players take it in turns to turn over two cards at a time. If they match, the player picks up the cards, if not, they are turned back. The player with the most cards at the end wins. The same can be done with one pack if a classification is decided upon e.g. trophic group.

Multiple cards

Snap – Combine two or three packs of cards or use a complete pack to play Snap. The one with all of the cards at the end wins.

Trump Tips

Teacher

Learning	Learning	Learning
		
Multiple cards	**Multiple cards**	**Learning**
		

Trump Tips

Teacher

BBSRC bioscience for the future **Multiple cards**

Gin Rummy – The game can be played by collecting sets of organisms e.g. from the same trophic level or from the same habitat.

BBSRC bioscience for the future **Multiple cards**

Thinking Snap – Extend the game of Snap by playing according to matching characteristics rather than exactly matching cards. Designate a characteristic e.g. virus or bacteria and have players call snap when the cards match the characteristic.

Trump Tips

Teacher

Multiple cards	Multiple cards
	

Case Study - Jeremy Pritchard

Teacher

Teaching evolution using Darwin Today trump cards – Jeremy Pritchard

I use the Top Trumps® for talking about phylogenetics in schools and at university events with young people. I talk about family trees as an introduction.

I then give out cards to students at random. Students with cards then have to come up to the front (don't tell them this at the start or no one will take a card!).

They shout out to the class what organism they are. Then I ask them to get into pairs with whatever organism they think they have the most in common with. You can ask the pairs why they chose each other (e.g. what are the common features of the two organisms).

These rules need not be taxonomically or even biologically correct (don't forget to explain any factual errors at the end).

Then ask pairs to find and team up with another pair, again get them to think of the rules they used. Depending on numbers you may be able to do another interaction.

You can then Blu Tack the cards on a whiteboard and draw in the lines of the tree.

I then explain that the tree is 'real' based on the rules they came up with. These rules are largely based on what the organisms looked like. Crucially they came up with the tree – the cards were shuffled and they made up the rules and pairings. This gives them some ownership.

I sum up by saying that what they have just done is what happened post-Linnaeus. Describing species in this way leads to the observation that some things are more similar to each other than others (hence the pairings). Subsequently biologists asked what the mechanism was – rejecting individual creation events. Various mechanisms were proposed, including Lamark's erroneous inheritance of acquired characteristics – easily disproved by the observation that one-handed people do not have one-handed children. Darwin came up with the right mechanism – evolution by natural selection.

Top Trumps Cards

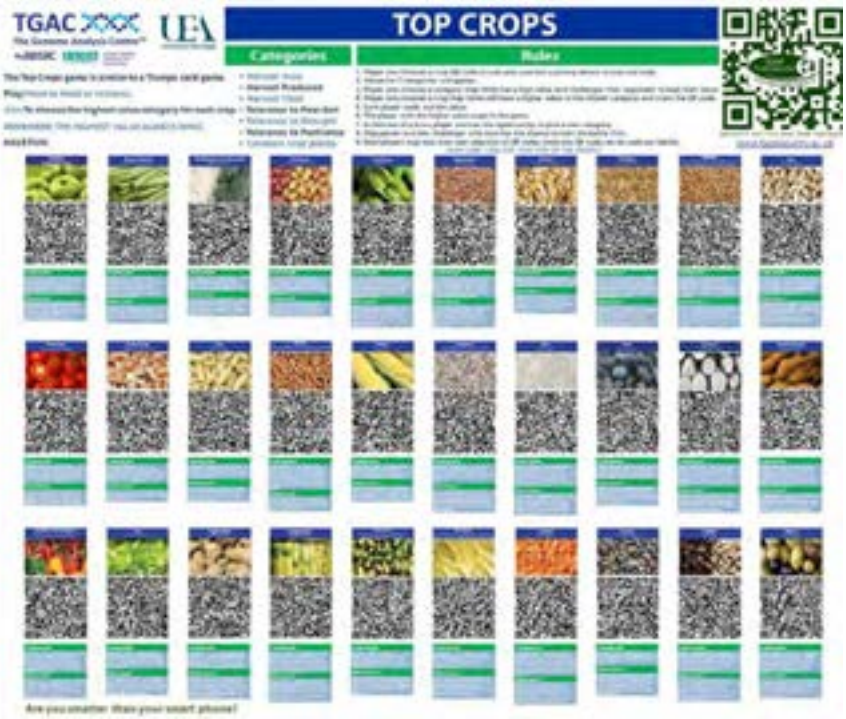
Case Study - Tristan MacLean

Teacher

Trump cards as an interactive poster – Tristan MacLean

Working with a final year undergraduate student we produced an interactive poster version of The Genome Analysis Centre (TGAC) Feeding the Future trump cards – Top Crops. The concept was to provide a means for multiple members of the public to engage with food security and crop genetics through the trump cards and their information without the need for a facilitator. The poster was developed as part of the science communication course undertaken by final year students in the School of Biological Sciences at the University of East Anglia. Using Quick Response (QR) codes for the data on the cards it was possible for anyone with a smartphone or tablet to read the data without it being visible on the poster. In order to fit the information required on the poster, the additional details on each card were rewritten to be more succinct and the data was converted into a QR code. The trump cards rules were modified for the public format and tablets were provided at events to enable members of the public without smartphones to play the game.

Scanning QR Codes from poster



A1 QR Code Poster

Parasites, immunology, competition and trump cards – Sheena Cruickshank

We use trump cards in the classroom with year 8 and 9 students from widening participation schools in Cheshire, Derbyshire and the Greater Manchester area. We organise the children into small groups of three or four and hand out packs of immunology or parasitology trump cards. Students play both matching games and the classical Top Trumps® game.

Students get very involved in the experience and are quite competitive. Once we have the students engaged with the topic we are then able to show them both whole parasites and sections of gut or parasites under the microscope, and have them counting parasite eggs. Being able to show the s tudents actual examples of some of the parasites they are learning about brings the activity to life. Many students are unaware of parasites so learn a lot of new information playing the parasite trumps. Here competitiveness in the game is often focused on the deadliest parasites or the most common parasites! Students then want to learn more about treatments, prevention and prevalence.

We find the games promote a lot of discussion about the roles of the immune cells with students learning about cell types they hadn't encountered before, and being fascinated about how many different cells there are and how diverse they are. Discussions often move into how immune cells protect against infection or why some infections evade the immune response. In both cases (immunology and parasitology trumps), we find it is critical to allow time at the end to enable this discussion to develop to embed the learning.

We have also used infection trumps with migrant communities groups in which English language may be limited. The activity is used to embed knowledge following learning activities in a classroom setting about infection and its spread. The fact that the cards enable participants to do reading activities as well as picture recognition helps cement science literacy with these students.

Sciencestars

Case Study - Sarah McLusky

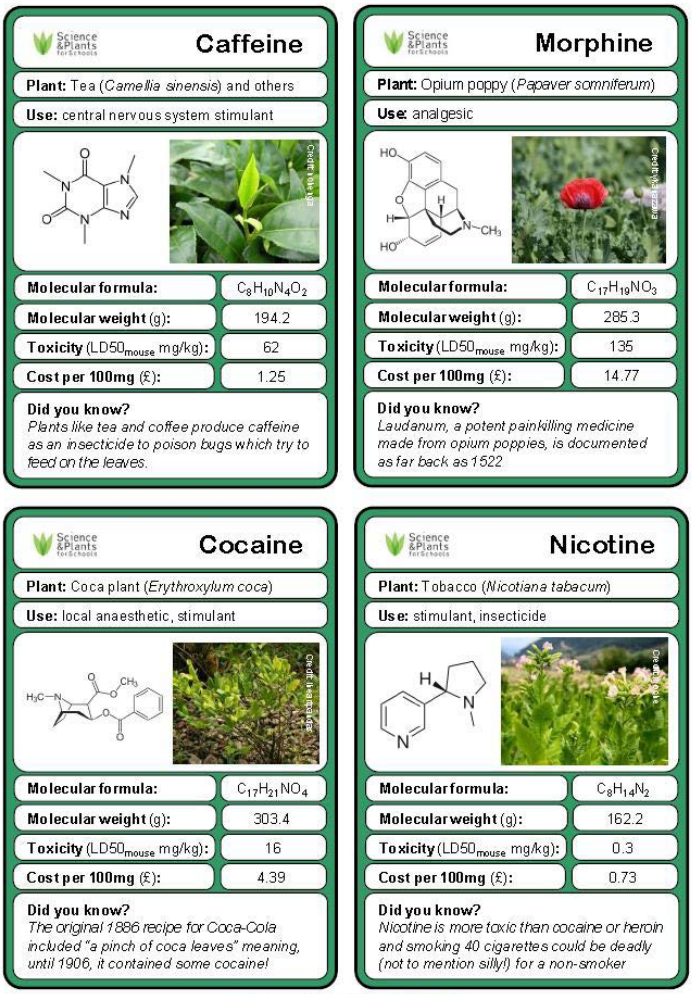
Teacher

Why trump cards are tops! – Sarah McLusky

I have always been fascinated by plant-derived drugs, but struggled to convey this passion to students without an overload of Latin names and chemical structures. I was lucky enough to get a SAPS Associate Award to develop my ideas for a Top Trumps® game.

When trialling the cards with my students I was impressed by how rapidly they got the hang of pronouncing the names of the plants and drugs. It helped them understand the concept of LD50 as a measure of toxicity, and they very quickly learnt which drugs were the most expensive, largest and, in particular, the most poisonous! The quirky facts on the cards were also popular and I overheard students chatting about them.

As with any educational resource, if overused they lose their impact, but used judiciously, trump cards are a great way to introduce potentially dry factual information in a fun way. They can also be used in so many different ways to encourage young people to find things out for themselves, to communicate and to collaborate.



SAPS Top Trumps

Case Study - Richard Chatwin

Teacher

A Race To Publish – Richard Chatwin

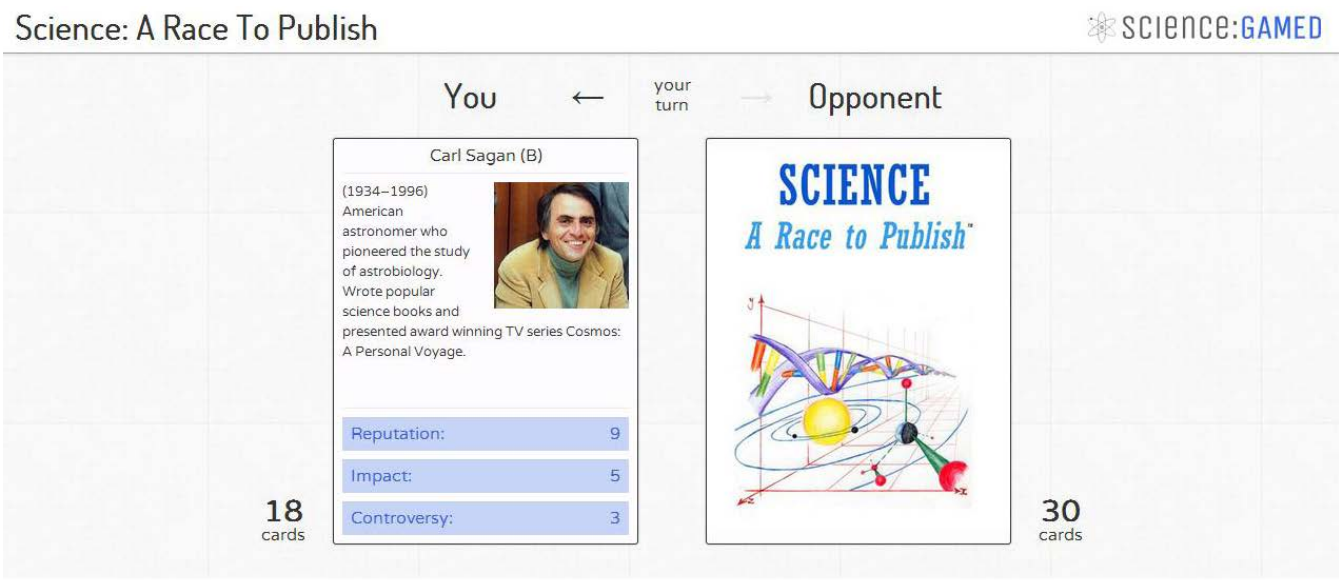
Science: GAMED produces fun games that are based on cutting edge research and the latest scientific discoveries. We love science. We also love games. That's why we make games inspired by real science. The best games invite you into their world and say 'these are the rules: what can you discover?'. You don't need to be a geek or a science whizz kid to have fun and understand the science in our games.

A Race To Publish is a card game targeted at 11-18 year olds that aims to introduce scientific theories and simulate the scientific process. Along the way players encounter famous scientists and discover all about career paths in science as well as learning how to manage a laboratory and a budget.

The game is composed of two phases, one of which is based on the Top Trumps® gameplay. The trumps card phase of the game features famous scientists, with players competing to win money for the second phase of the game. You can play the scientists trumps part of the game on line at:

www.sciencegamed.co.uk/games/a-race-to-publish

Players can then spend their money in the second phase doing research and hiring a lab team.



This is an extract from a new card game called 'Science:A Race To Publish'. The game is targeted at 11-18 year olds and aims to introduce some core scientific and general management concepts including famous scientists and theories, science communication theory, career paths in science and money/laboratory management.

Before you ask, two things we should say about this mini-game. Firstly, the letters next to a scientist's name represents their primary discipline-Biology, Physics, Maths or Chemistry. Secondly, the scores associated with each scientist should be taken in the context which they're given- a game! Obviously every scientist presented here has had a huge impact on their respective fields, but giving them all an impact score of 10 wouldn't make for a very fun game!

Contact us for more info

Race to Publish

Case Study - Richard Chatwin

Teacher

Games can stimulate positive emotions in players, which in turn can aid the learning process. They can also provide different 'levels' of engagement to help accommodate different types of learners and players. For example, in A Race To Publish the scientist trump cards have four distinct bits of information: the scientist name and their disciplines, their picture, a brief history of the scientist and some statistics (reputation, impact and controversy). The statistics were given a scale of 1-10 and the scientists scores were approximations based on their discoveries and known historical information.

The game could work with just the name of the scientist and the stats, however we found during play testing that players will get drawn to different parts of the card. Learners who prefer visual stimulation may get drawn to the pictures, whilst those more interested in detail will read the scientist summaries. Obviously every player is different, but the key point is that multiple avenues of learner engagement are available, which probably helps explain why Top Trumps® is such a popular, wide-reaching game in general.

During our play testing of the game with both school children and scientists, including BBSRC researchers, we learnt some valuable lessons:

Keep the game simple. Our game had 2 phases, but many players found the second phase (the non-trump card phase) too complicated, so we had to simplify it. Once you've been spending time designing a game, you can sometimes lose sight of how it appears to new players – that's why play testing is so important.

Do make it clear when you're using any arbitrary rules or measures to make the games work; for example in our case giving each scientist stats such as 'reputation' and 'impact'. There's nothing wrong with this if it helps the game work, and it can even help instigate worthwhile, topical discussions about how 'correct' the stats are, but these sort of rules should be identified clearly at the start.

Top trumps focuses on 'combat'/head-to-head play, but it's important to emphasise that science is more collaborative than competitive. This may not be applicable if your top trumps relate to things like immunology, but for us dealing with scientists, it was something that was pointed out.

We also learnt that if you're developing a game like this, it's important to get feedback from the scientific community – in our case we got this from the BBSRC researchers. This type of feedback is extremely useful, because you want to ensure that the impression of science you are making with your game is a good one – and people who work in science on a daily basis are the best advisors on this!

We got some very positive feedback about the game overall, and some quick (non-scientific) surveys taken before and after by players indicated that it did help them learn about more scientists and scientific theories than they knew beforehand.

One of the great things about top trumps is its capacity to put lots of different cards in front of players during a game. This increases the chance that someone playing might find a card or topic that's interesting and inspires them to go and investigate that topic further. Add this to the fact that it's a simple but engaging game, and it becomes a very attractive approach to communicating, and bringing to life, areas of science.

Trump Card Sets

Teacher

Beat the algae – University of Cambridge
www.plantsci.cam.ac.uk/meetthealgae/pdfs/top-trumps.pdf/view

Plants, drugs and medicines – SAPS
www.saps.org.uk/awards/1230

Cell Trumps – Centre of the Cell
www.centreofthecell.org/centre/?page_id=226

Fungus trumps – Woodland Trust
www.naturedetectives.org.uk/download/trumps_fungi.htm

Dr Hal's Chemistry Trumps – Dr Hal
www.drhal.co.uk/shop/index.php?main_page=product_info&cPath=&products_id=3

Visual Elements Trumps – Royal Society of Chemistry
www.rsc.org/shop/books/2008/9781847559005.asp

Volcanoes Top Trumps® – Strengthening Resilience in Volcanic Areas (STREVA)
www.volcanoestoptrumps.org/

Energy database card game – The University of Manchester, Dalton Nuclear Institute
http://www.dalton.manchester.ac.uk/connect/learn/

A Race To Publish – Science:Gamed
www.sciencegamed.co.uk/games/a-race-to-publish/

Trump Card Sets

Teacher

Skeptic Trumps
www.crispian.net/page3/page3.html

Further Reading

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Science Top Trumps blog post – Alice Bell
alicerosebell.wordpress.com/2011/04/18/science-top-trumps/

Authors: Tristan MacLean, Sarah McLusky, Sheena Cruickshank, Jenni Rant, Richard Chatwin

Acknowledgments: Jeremy Pritchard, Emily Angiolini, Penny Hirsch, Rachel Ayers, Chris Bass, Felicity Crotty

Design: Creative Sponge, www.creativesponge.co.uk

Feedback: Please provide us with feedback so we can improve this resource.
Email: schools@bbsrc.ac.uk