

Repackaging Physics Qualitative Research Debrief

IOP

Institute of Physics

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16th Feb, 2007





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Background, Objectives and Methodology 1



Background

- Fewer students are choosing to study Physics at university
- IOP has developed two strategies to reverse this trend:
 - A) New Degree
 - Broad-based science degree that doesn't require physics and maths A-Levels, that can be a spring-board to a physics degree
 - B) Repackaged Degree
 - Representing the physics degree syllabus in a more contemporary, motivating way to attract students who have the relevant A-levels but who do not consider studying physics
 - This can mean "restructuring" (where the focus is on changing the content itself) and "rebranding" (with the onus being on how the course is marketed)
- This research focussed on the first stage of developing the repackaging strategy



Stage 1: Brand Audit research objectives

- Clarify current attitudes towards and perceptions of Physics
- Identify the key barriers and hooks that affect the decision of whether to study Physics or not
- Understand the degree selection process



Methodology

- **11 x 1.5 hour groups**
 - 6 with A-level Physics students; 2 intenders, 2 rejectors, 2 mixed
 - 2 with GCSE students, mixed
 - 1 with Physics undergraduates
 - 1 with non-Physics undergraduates who did Physics and Maths A-levels
 - 1 with mixed undergraduate group
- **1 x paired depth with AS level Physics intenders**
- **6 x 1 hour depths with Physics teachers**
 - Physics graduates and non-Physics graduates; mix state and private
- **4 x 1 hour depths with parents**
 - Parents of respondents; mix state and private
- **2 x 1 hour depth with career advisors**
 - Mix state and private



Sample Structure

Group No.	Plan to do Physics degree?	Location	School type
1	Yes	London	Private
2	Yes	Manchester	State
3	No	Manchester	Private
4	No	London	State
5	Yes and No	London	Private
6	Yes and No	Manchester	State
Group No.	Doing Physics degree?	Location	
7	Yes	London	
8	No	Manchester	
Group No.	Plan to do Physics A-level?	Location	School type
9	Yes and No	London	State, Girls
10	Yes and No	Manchester	Private, Boys



Findings contradict the scope of this project



Problem is less about Physics degree courses,
more to do with the idea of a Physics degree per se

The degree / university journey 3



Why go to university?

- University is seen as the 'norm'
 - *'it's just the done thing (A-level)*
- Considered a rite of passage
- Essential for a good job
 - *"I would rather study a specific degree to get a specific job"* (A-level student, state school)
- Buys time to discover self and decide on future career
- A chance for intellectual expansion



Choosing degree subject and university are usually mutually exclusive

Subject

- **Do I enjoy it?**
 - Will I be motivated for 3 or 4 years?
- **Am I good at it?**
 - Will I excel at it (need to get 2:1 for job market)?
- **What can I do with it?**
 - Will I be employable at the end of the degree? (pay off my debt)

University

- How does it perform?
- Where is it?
- Is it campus or city based?
- What's the accommodation like?
- What do people think of it?
- Did I like it when I visited it?
- Will the teaching style suit me?
- Will I fit in?



Subject decided first, then shortlist of universities is created

Year 11/early Year 12

end Year 12

Subject

- Do I enjoy it?
- Am I good at it?
- What can I do with it?

Point of influence lower 6th latest,
ideally GCSE

University

- How does it perform?
- Where is it?
- Is it campus or city based?
- What's the accommodation like?
- What do people think of it?
- Did I like it when I visited it?
- Will the teaching style suit me?
- Will I fit in?

General assumption that a reputable
uni. will offer a good degree



The choice of university is made with more confidence than subject

Year 11/early Year 12

end Year 12

Subject

- Do I enjoy it?
- Am I good at it?
- What can I do with it?

Leap of faith/shot in the dark

University

- How does it perform?
- Where is it?
- Is it campus or city based?
- What's the accommodation like?
- What do people think of it?
- Did I like it when I visited it?
- Will the teaching style suit me?
- Will I fit in?

Assured decision



A wealth of resources are available

Subject

- Parent's evening
- GCSE/A-level results
- 'Anecdotal' opinions picked up from:
 - Parents
 - Peers
 - Media

University

- League tables
- Independent guides
- Prospectuses
- Websites
- UCAS
- Open days
- Siblings/friends who are already students
- City reputation
- Nightlife

Opportunity to provide more concrete information



A very receptive and anxious audience

- **Aware that this is a big decision that will affect the rest of their lives**
 - exacerbated by debt
- **Would like to feel reassured on subject choice**
- **Reassurance often lacking:**
 - Careers advisors seen as 'hit and miss'
 - merely directing students to more information, not consulting
 - Teachers sit on the fence
 - Parents bring own prejudices to the table
- **The onus is on the student to proactively research it themselves**
 - *"my son's a bit lazy so I'll do the research no doubt"* (Parent, AS level)
 - *"we're not meant to give our opinion"* (Physics teacher)
 - *"we point them towards information but it's their responsibility to explore it"* (Careers Advisor)



Key findings to action

1. Timing of communication

1. Degree subject choice is made:
 - Before any universities are considered
 - Before any specific courses are investigated→ Early lower 6th latest

2. Content of communication

1. Selling subject benefits first; courses second
 - Prioritise most influential information content e.g. Career prospects, social lifestyle, experiencing something meaningful

3. Hunger for information

1. Resources often underutilised / low ability in researching
2. Strong desire for information



What's wrong with Physics? 3



So why aren't young people
considering a physics degree?



How does Physics fare on the key criteria?

Subject

- **Do I enjoy it?**
 - Will I be motivated for 3 or 4 years?
- **Am I good at it?**
 - Will I excel at it (need to get 2:1 for job market)?
- **What can I do with it?**
 - Will I be employable at the end of the degree?





Do/will I enjoy it?

- **Uninspiring teachers**
 - often lack confidence and passion (often linked with non-graduates)
- **Too theoretical and dry, not enough practical or real world application**
 - Too many formulae
 - Practicals lack exciting relevance
 - *'it's just about lighting up bulbs...or playing with springs'*

tamf13 Says:

February 8th, 2007 at 9:51 pm e



In general i have found physics to be one of the more enjoyable sciences at GCSE level. It addresses many topics of interest as they pertain to everyday life and the way things around us work. However, topics such as circuits seem to drag on and it feels like too much time is spent on it. I enjoy seeing the practical experminets. Another downside is the amount of formulas needed to be learnt for the final exam as they play a huge part. It is very mathematical which is not a strength of mine. For this reason i am not taking Physics for A level.

tamf29 Says:

February 12th, 2007 at 9:25 pm e



I personally think physics is a little boring this year, perhaps due to the syllabus, perhaps due to my teacher. i found the first module (particles, radiation and quantum phenomena) quite difficult as the information wa snw to me. But the kinematics module i found easier as i covered a lot of it in maths. For this reason i find this module quite easy in comparison. I have found the practical assessment papers quite easy, or at least easier than the theory, although some of the practicals we have done in class seem of little or of no use.



Do/will I enjoy it?



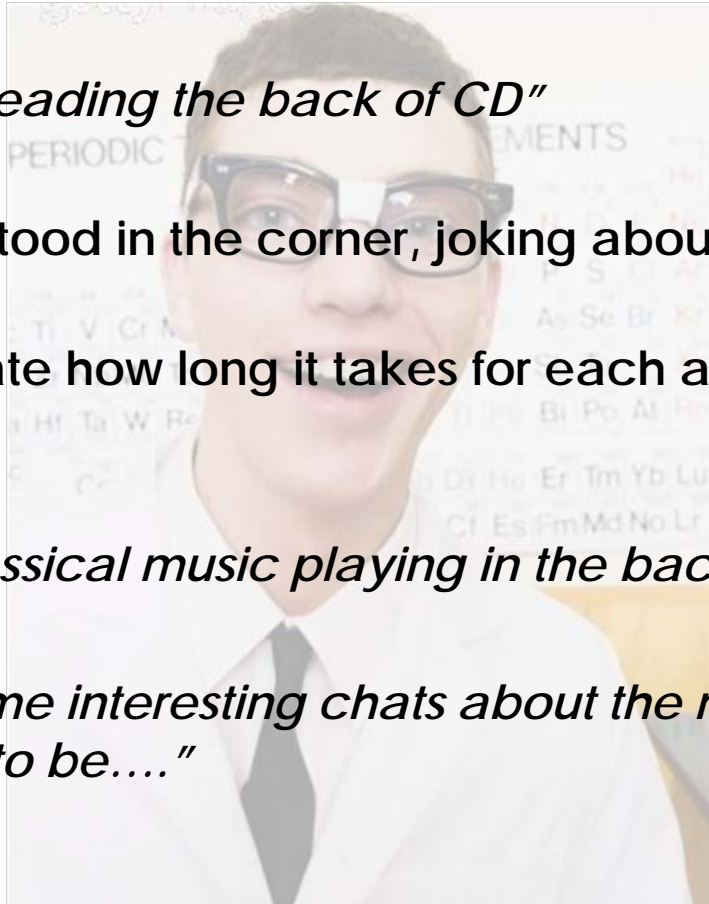
- Hard work/long hours
- Populated by 'geeks'
 - not the kind of person they want to socialise with

“Whether it’s true or not, you’re less likely to get in with a fun crowd on a physics degree” (A-level, rejector)



.....the physics party – geeky (but interesting)

- *“They’d all be reading the back of CD”*
- *“They’d all be stood in the corner, joking about gravity”*
- *“They’d calculate how long it takes for each atom of alcohol to get them drunk”*
- *“There’d be classical music playing in the background”*
- *“There’d be some interesting chats about the meaning of life and how we came to be....”*



Am I/ will I be good at it?



- **Difficult:**
 - Maths required
 - Lots of abstract concepts to grasp
- **Poorly qualified/unconfident teachers –**
 - *“if they don’t get it how can I?” (A-level rejecter)*
 - *“loads of teachers teaching Physics who haven’t done the A-level” (Teacher)*
- **Need ‘innate’ ability**
 - *“you either get it or you don’t” (GCSE)*
- **Hard subject means harder to get a good grade at degree**
 - *“It’s so hard, I worry I’d be setting myself up for a fall – there’s easier subjects” (A-level rejecter)*



What will I do with it?



- **Lack of awareness about specific career potential**
 - Lack direction / information from career advisor
- **Teaching is the most salient career**
 - 'research' not really understood and lacking in real world impact
 - *"sounds like some never ended investigation into something pointless"*
- **Even those who accept the idea of physics leading to career can under-estimate the opportunities available**

tamf01 Says:
February 11th, 2007 at 11:52 pm e

I'm planning to start a 4-year Physics course at Oxford University next year, dependent on getting AAA at A-level. The prospect of studying Physics to such a high level, of learning so much and getting the opportunity to follow a career on Physics (whether it be teaching, lecturing, research) is very exciting. I am somewhat nervous about my A2 exams, as my future rests on these results. I am therefore planning to make sure I do as much revision and work as possible in order to do well and secure my university place.

PHYSICS IS LACKING SALIENCE



What will I do with it?



- **A-level students are not as proactive as the system expects them to be**
 - They are busy with A-level and everyday considerations and used to having information spoon fed to them
 - *“we’re used to being given things on a plate, suddenly we’re expected to find it out for ourselves”*
 - **Although there may be information out there, they do not necessarily come across it**
 - *“We have lots of resources and good information, but kids are not always sufficiently driven or able to find it.” (Careers advisor)*
 - *“If they don’t think physics is for them in the first place, they’re unlikely to find out about it” (Careers advisor)*

PHYSICS IS LACKING SALIENCE



What will I do with it?



- General low/hidden status of physicists in society
- No current, realistic role models
 - *“old, dead or disabled” (Physics undergraduate)*
- Limited coverage of role of physics in the media
 - news articles, awards (c.f. high profile architecture awards) TV programmes (fiction and non-fiction)
- Salient stories are usually about its decline e.g. departments closing / admissions low

PHYSICS IS LACKING SALIENCE




What will I do with it?



- **Other science degree subjects are more salient**
 - Generally and specifically in terms of career opportunity
- **Biology** = doctor, vet, pharmacists, any form of therapist (e.g. speech, nutrition etc.), botanist, geneticist, finding a cure for cancer, ER, Casualty, Pet hospital, debates about stem cell research etc
- **Chemistry** = industry/ manufacturing, pharmaceuticals, oil industry, forensic scientists, CSI , Waking the Dead
- **Computer science** = communications (internet, mobile), city, software developer, IT, invention, the future, Google, Microsoft, Apple
- **Engineering** = building roads and bridges, aviation, automotive, manufacturing, oil industry, Formula 1

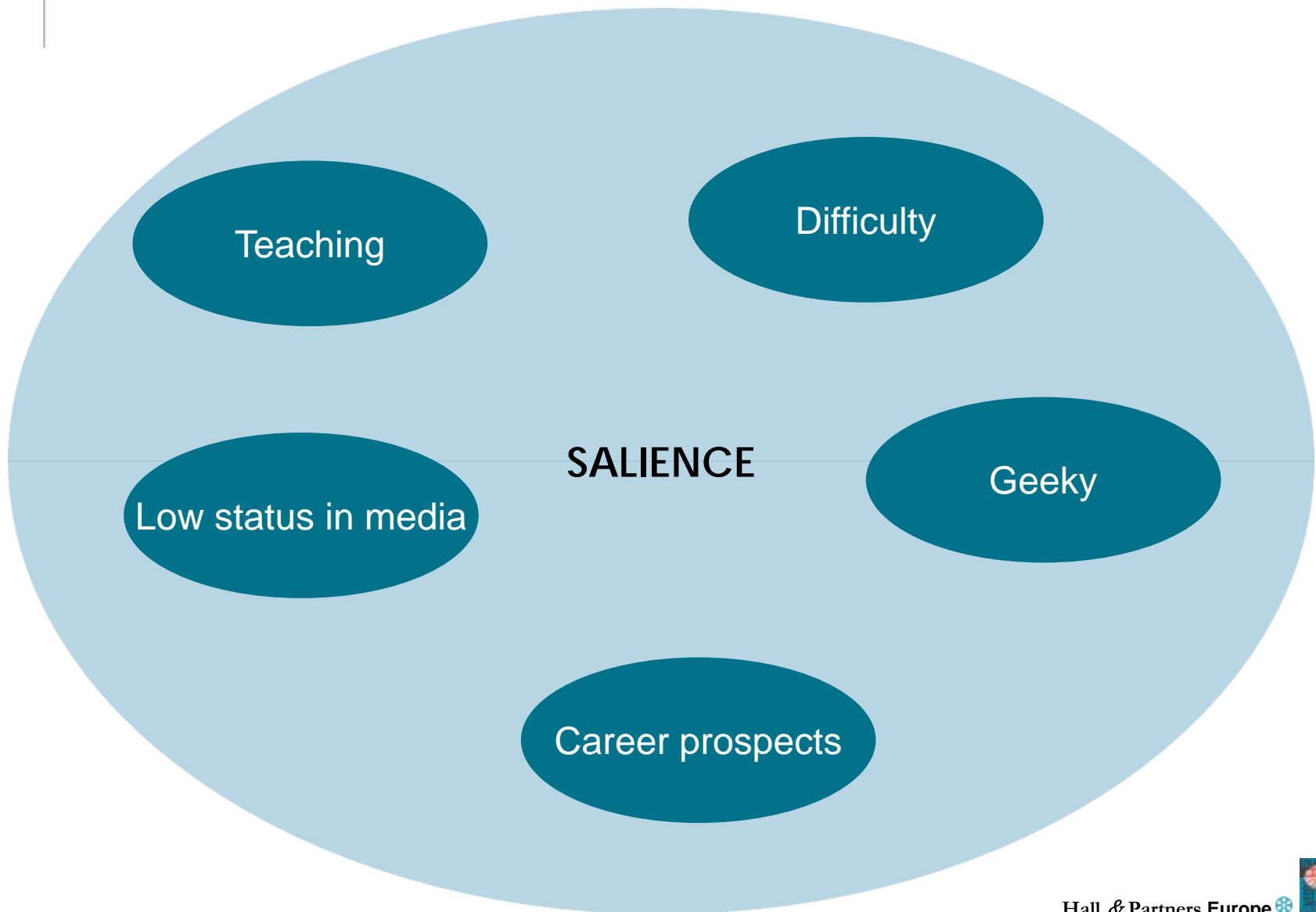
Physics needs to reclaim its role in society



- 
- ***“It’s just very closed, geeky and oddball. Physics role in society is very backroom, what physicists do just isn’t publicised, you never hear about it”*** (Private school teacher)
 - ***“A career in physics just doesn’t seem glamorous or attractive”*** (Private school teacher)
 - ***“Not really sure what you could be if you did physics, maybe an electrician..?”*** (GCSE Physics student)
 - ***“I wouldn’t want my son to do physics as it doesn’t lead anywhere – with computer science the world’s your oyster”*** (Parent)
 - ***“‘spose I’d be a teacher because I’ve seen in the NPL and it was definitely not my thing”*** (Physics rejector)



Summary of challenges



Tackling the challenges 5



Lack of salience can be an opportunity

- People don't know much about physics

- This lack of knowledge presents the opportunity to tell them

Tackling the challenges 5.1

What's right with Physics?



Physics also has positive attributes

- Badge of intelligence
- Well-regarded, respected



“Physics students know they are intelligent. I think they enjoy it, you know impressing people by talking about relativity and stuff” (A-level conflict)

- Curiosity



“Employers respect a physics degree because they know it is a hard subject so you’ve got to be clever” (A-level intender)

- Making a difference to the world/mankind



- Future-facing



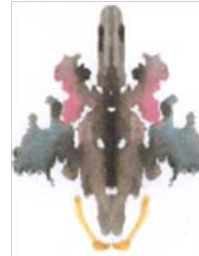
“Physics is all about the future – inventing new technologies” (A-level conflict)

“modern – at the minute – continuously changing” (A-level rejector)



Physics also has positive attributes

- Thinking not learning



"I just feel this real sense of freedom – your thinking isn't constrained" (A-level intender)

- Intellectual aestheticism



"It's satisfying when it all makes sense" (A-level intender)

- Challenging, engaging, fun



"It's hard but I like the challenge" (A-level intender)

Physics can inspire

- **Interesting** - for those with an inquiring mind
It is about understanding how life, the world, the universe works
- **Has a noble purpose**
Applying knowledge of how this works for the benefit/ advancement of mankind
- **Dynamic, future-facing, cutting edge**
Theories constantly evolving and moving forward - all technological innovation starts with physics
- **Creative**
Creating new theories/ideas or applying theories/ideas in new ways to create new machines/technology



Geek is not all bad...

- **Stereotype 'geek' general to science including maths and computing**
- **Physics fares better than most**
 - Can be seen as confident
 - *"individual, interesting" (AS level)*
 - *"stands out from the crowd" (A-level)*
 - *"you imagine science students to be real boffins although the boy up the road does physics and he's pretty outdoorsy" (Parent, AS level)*
- **Being a geek can be accepted if you end up earning more money than others**
 - *"it's not always bad to be a bit geeky if you end up making loads of money when you're older"*



Physics is relevant

- Space – designing rockets, satellite systems
- Medical - Cancer treatment, technology to help premature babies
- Communication - mobile phones, i-Pods
- Transport - Airbus A380, bullet trains
- Weaponry
- Cutting edge research – search for smallest particle
- Climate change – helping develop more renewable resources
- Design and manufacture – e.g. Dyson vacuum cleaners



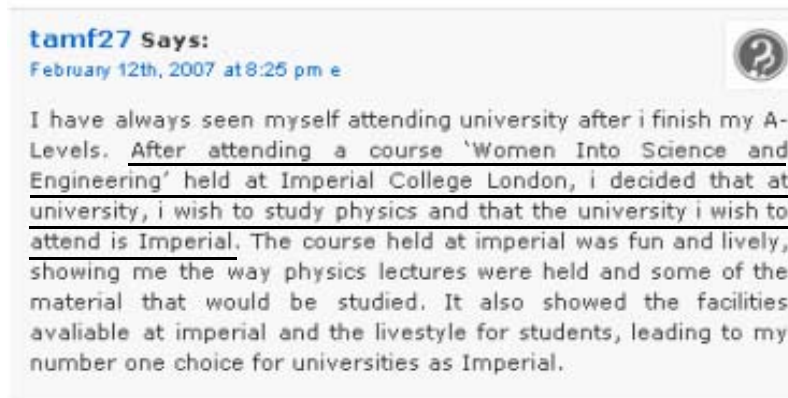
Tackling the challenges 5.2

The Vehicle

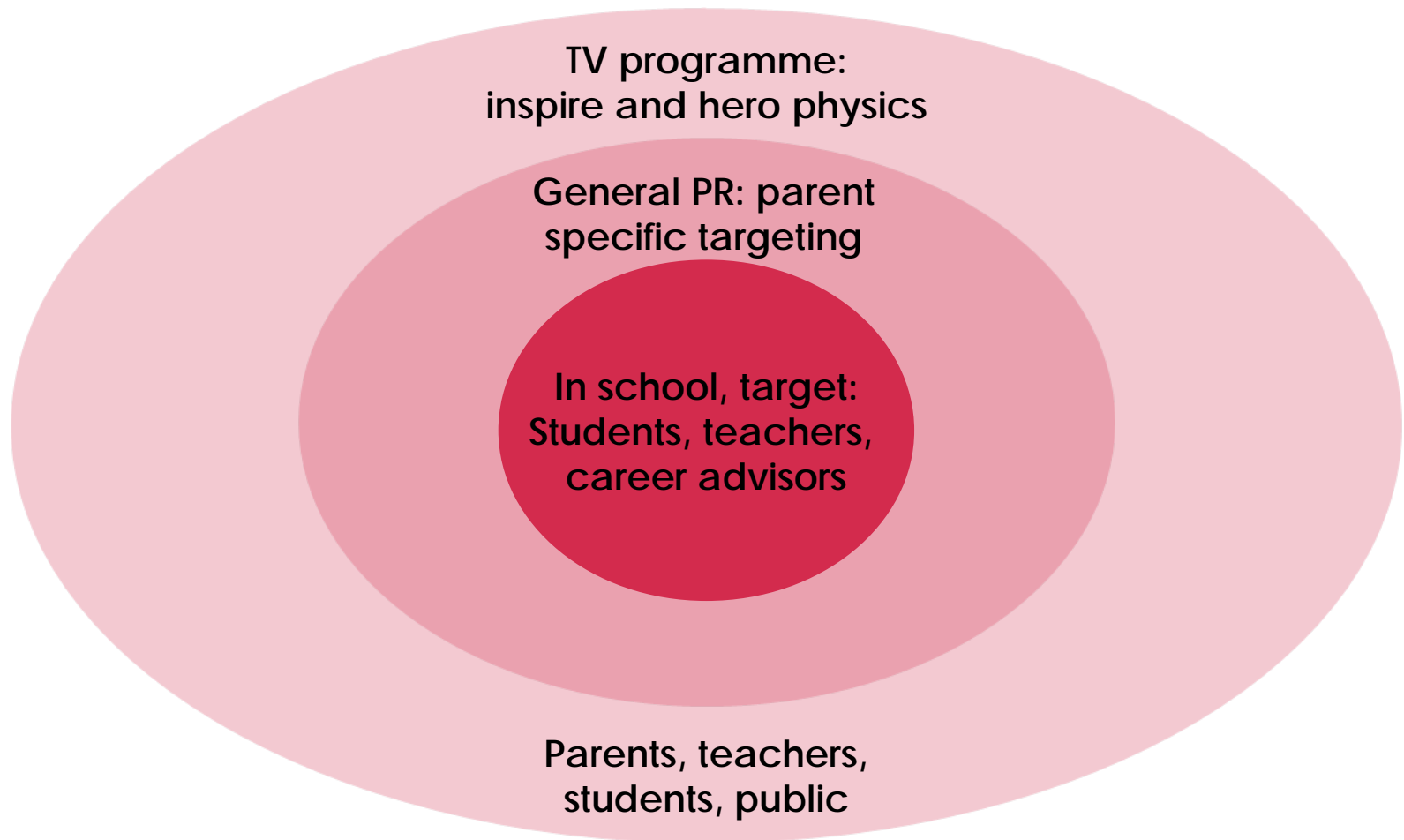


Students are receptive to persuasive information

- Negative beliefs and perceptions can be countered with persuasive information
- There are several information channels that can be used
 - Courses (see blog)
 - Open-days
 - School talks / events
 - Brochures
 - Website
 - Careers advisor information
- N.B. More fundamental issues (i.e. physics experience at school) require long-term solutions,
 - But, there are still short-term solutions that will help



Layers of communication would work best



Tackling the challenges

Teaching

Difficulty

Low status in media

Geeky

Career prospects



Teaching

- **Make Physics more 'real world' / relevant / meaningful**
 - Teaching should increase the relevance of the subject
 - E.g. climate change, everyday technology, media issues such as the Litvinenko case
- **In the long term, higher calibre teachers are needed**
 - More passionate and confident to field questions
- **The syllabus should also be developed**
 - Inject **creativity** into teaching process
 - E.g. modelling – *'how would you calculate how fast this forest fire would spread'*
 - Make physics feel more **progressive** e.g. artificial intelligence, alien exploration, climate change
 - Make physics more **exciting**
 - E.g. field trips, loud, shocking, dangerous practicals, computer / film based learning

"I think the Institute of Physics have already made some headway with Advancing Physics – they encourage more independence at AS-Level – you have to give your own presentation and analyse your own data and so on in a more practical way. They have also reduced some of the dryer stuff like mechanics and added in some of the more interesting stuff like quantum" (Physics private)



Difficulty

- **Can be positive – if viewed as challenging, stimulating,**
 - Physics can become an index of ability (especially for employers)

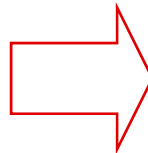
→ Dispel the over-estimation of maths content

- **If seen as less complex, students will be less intimidated**
 - 'Einstein myth' can be dispelled



Geeky

- Not exclusive to physics
- Convey positive 'social' associations
 - e.g. prospectus imagery, positive student image, open days experience, extra-curricular department activities
- Once career prospects are accepted, the idea of being a physics geek becomes less of an issue



Career prospects



- **Convey Information in interesting format**
 - e.g. Impressive website / compelling brochure
- **Tell people about variety of applications and salary potential**
 - Push the information to schools, do not expect student to come and find it
- **In the long term, reach parents, careers advisors etc.**
 - Improve links between industry and universities (raise profile of existing links)

Communicating career potential is the quickest win

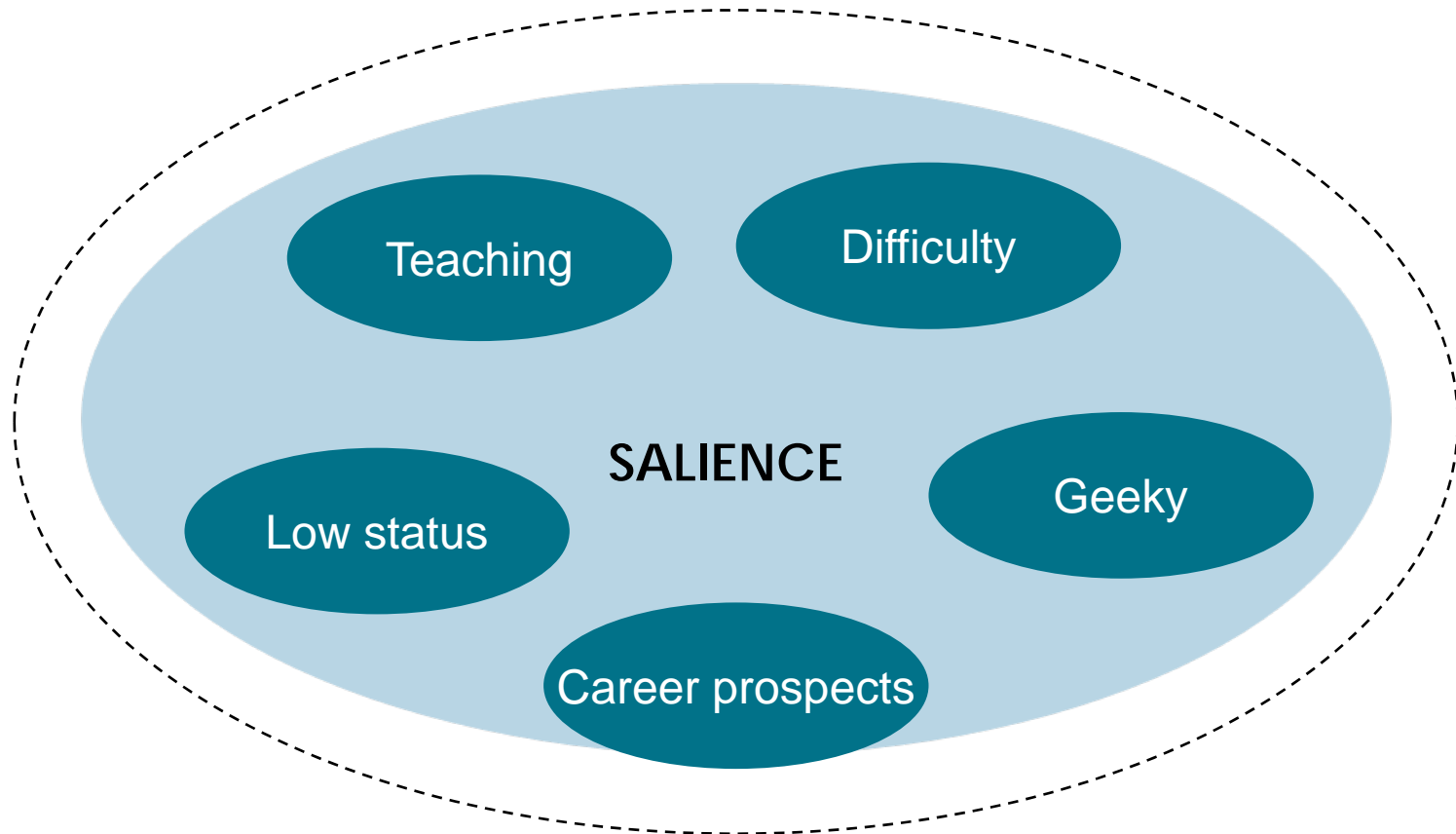


Low status in media

- **Raise profile through media relationships**
 - raise physics profile and debunk negative myths
 - Promote schools programme
 - Introduce positive role models
- **In the long term, explore TV programme opportunities**
 - Engage through entertainment c.f. Cracker and psychology / E.R. and medicine, CSI and forensic science
- **Champion physics contribution to society**
 - Introduce physics awards for excellence with wider social meaning attached e.g. application of physics to environmental advances

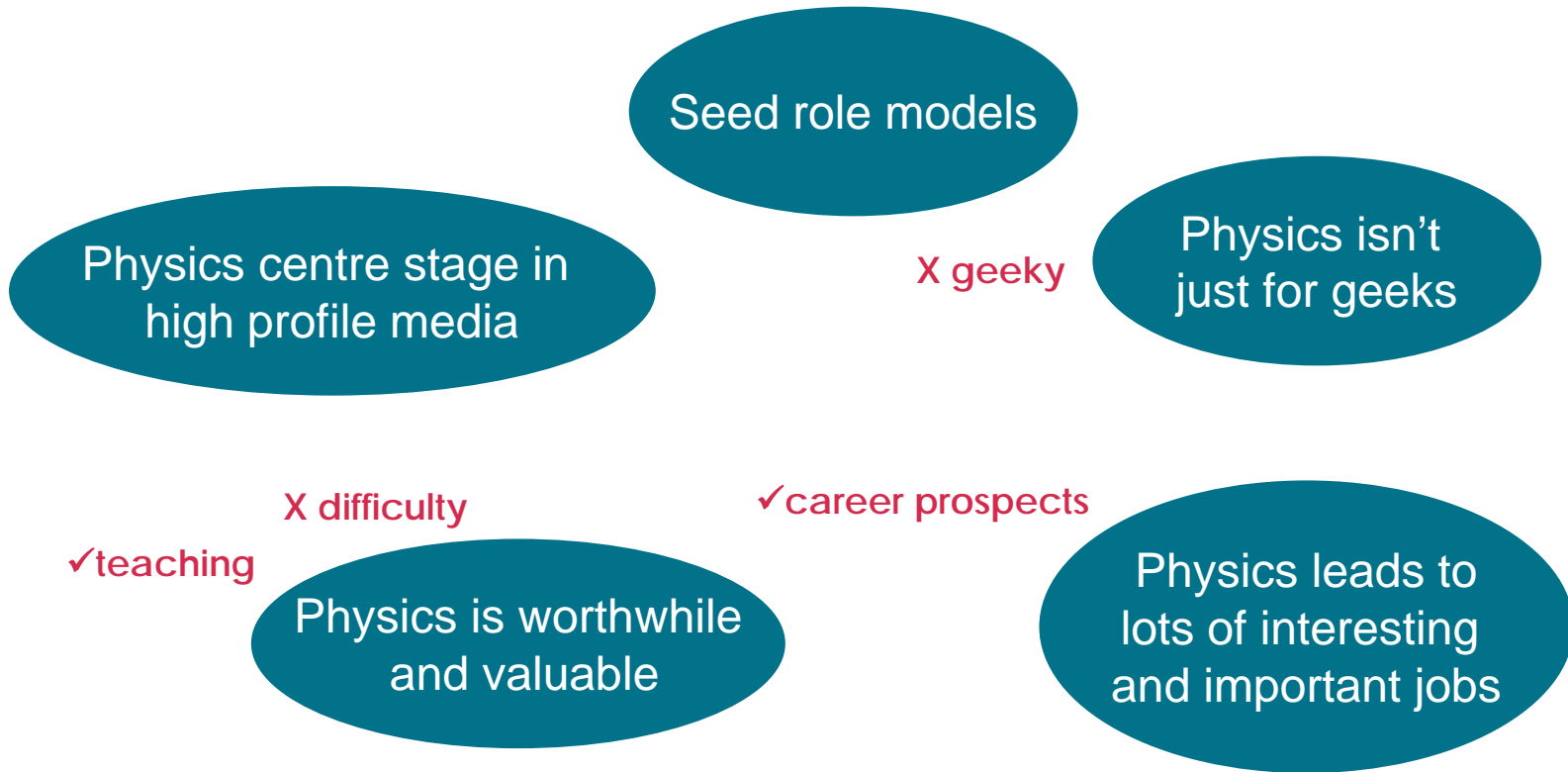


A role model approach tackles all



Communicating career prospects is part of the solution
activity on a bigger scale is also necessary

It can create a virtuous circle...



...and put a face/faces to the faceless science



Role models are hugely influential and inspirational for teens

- Teens can be receptive to role models
 - They are hungry for guidance
- Role models – if well selected – can be a compelling way to reach people
- Currently there are sub-optimal role models
 - teachers are often un-inspiring



“if I knew Richard Branson had done physics that would be good – he’s successful, innovative” (Parent)

“it would be good to have a role model like David Beckham who shows you what can be achieved” (Physics rejector)



However we must get it right

- Shatter negative image:

- Old
- Mad
- Dry
- Dull
- Geeky
- No communication skills
- Incomprehensible
- Not linked to real world

“The reason I want to do physics for a-level is that we’ve got a really cool teacher. He is young and quite cool and he talks to us in our language , you can relate to him and he just makes it more fun and interesting” (GCSE conflict)

“our physics teacher is just weird, he wears a leather waistcoat – urgh” (A-level conflict)

Looking for Jamie Oliver(s) of Physics



Next steps



Next steps

- Regroup 23rd February 12pm for semiotic presentation and discussion
- Suggest workshop approach still valid, but objectives changed
 - Define Physics in order to form basis of all communication efforts
 - Brainstorm ideas for short term wins (potential information vehicles):
 - Role model(s) / Brochures / Website / TV show
 - PR angles
 - Ways to raise social status
 - Resources / training for career advisors
 - Develop communications brief
 - Focus on how best to communicate Career information
- Could extrapolate learnings for university degrees e.g. improving relevance, injecting excitement, countering negative associations
 - (although this is a small part of the bigger issue)
- Develop long term strategy i.e. improving school experience



Straw man for Physics

What is Physics:

The endeavour to understand how life, the world, the universe works

Core attributes:

Applicable, creative, visionary, enabling

Tone of voice:

Dynamic and inspiring but inclusive: head in the clouds but feet on the ground

Role of Physics in society:

To seek and apply knowledge of the natural world for the benefit and advancement of mankind

Role of communications:

To demonstrate how vital Physics is to civilisation

Creative thought:

There is no future without Physics



Appendix

BLOGS



A-Level

Thinking about my future blog 29

Just another WordPress.com weblog

One Response to "Your experience of your physics A-level"

tamf29 Says:

February 12th, 2007 at 9:25 pm 

I personally think physics is a little boring this year, perhaps due to the syllabus, perhaps due to my teacher. i found the first module (particles, radiation and quantum phenomena) quite difficult as the information wa snew to me. But the kinematics module i found easier as i covered a lot of it in maths. For this reason i find this module quite easy in comparison.

I have found the practical assessment papers quite easy, or at least easier than the theory, although some of the practicals we have done in class seem of little or of no use.



A-Level

Thinking about my future blog 29

Just another WordPress.com weblog

One Response to “Your Future”

tamf29 Says:

February 12th, 2007 at 9:14 pm e



I currently study Geography, Maths, Biology and Physics at A-level, and at present I am enjoying all four. With roughly a year and a half left at school, I plan to reach or a least try to get a high grade in each of these subjects (at least a B). After this i plan to go to university to study possibly Geography or Economics, although these plans aren't final. I am considering geography as this is my favourite subject out of the four.

I haven't thought too much about my future after university at the moment and so i can't really comment on what i would like to do, although i would like to use my degree in goaining a good profession. In general i am happy with the way my studies are progressing.



A-Level

Thinking about my future blog 28

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One Response to "Your experience of your physics A-level"

tamf28 Says:

February 12th, 2007 at 8:49 pm 

so far i have found some parts of physics quite hard. amongst the things i dislike are vectors. another thing i have found, is that i am losing lots of marks on past paper questions for not putting units, or putting the wrong units, which i find quite annoying. i also dislike the way we sometimes have to convert unit to unit. say for instance convert cm cubed into m cubed. i find this quite difficult.



A-Level

Thinking about my future blog 27

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One Response to "Your Future"

tamf27 Says:

February 12th, 2007 at 8:25 pm e



I have always seen myself attending university after i finish my A-Levels. After attending a course 'Women Into Science and Engineering' held at Imperial College London, i decided that at university, i wish to study physics and that the university i wish to attend is Imperial. The course held at imperial was fun and lively, showing me the way physics lectures were held and some of the material that would be studied. It also showed the facilities available at imperial and the livestyle for students, leading to my number one choice for universities as Imperial.



1st Year

Thinking about my future blog 30

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One Response to “Your Future”

tamf30 Says:

February 12th, 2007 at 4:25 pm e



Although I do have a picture of what I might be doing in the future, it might not be what I really want or really end up doing in the end. Realistically, physics has many many applications, for example, after university I could take up a job in the industrial sector, economic sector, or do more research.

I am actually doing theoretical physics rather than the generalized physics that most people do, this course doesn't really give me that many options for my future to be honest, which means that 9 out of 10 i will be doing research after university. Although I did hear that I might have the option to work for the government developing secret weapons and stuff, which sounded like quite fun!



AS – Level

Thinking about my future blog 19

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One Response to “Your Future”

tamf19 Says:

February 12th, 2007 at 12:30 pm e



for my future i am thinking of studying engineering at univercity. i have come to this decision after looking at lots of courses. enginerring seems to bring in the practical side of physics i enjoy and uses it in a real life situation. i had thought of studying medicine or maths at uni but these do not seem so interesting.



A-Level

Thinking about my future blog

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One Response to "Your Future"

tamf01 Says:

February 11th, 2007 at 11:52 pm e



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A-Level

Thinking about my future blog 06

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One Response to "Your Future"

tamf06 Says:

February 11th, 2007 at 6:11 pm 

I was thinking of continuing after college and going onto university then hopefully getting a very well paid job! Not too confident how i will do though because a good degree doesn't mean as much these days and doesn't guarantee a job at the end of it. What would be good would be for a company offering a good job to sponsor me through university but at the same time i dont want to be tied down to a specific job at the end of it!



A-level

Thinking about my future blog 08

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One Response to “Your experience of your physics A-level”

tamf08 Says:

February 11th, 2007 at 6:01 pm e



Although most of the course has been interesting, i have found that one of my teachers (I have had 2, both sharing the course, so one teaching half the AS course, the other teaching the other half. Now, one teaching half the A2 course, the other teaching the other half.) has not been competent to teach at A-Level standard. This has really hindered my advances in Physics and possibly persuaded me to choose to study Maths at university.

The syllabus I have studied has been interesting, however, the uses of each of the pieces of theory has not been given. If there were also more hands on topics the course would be vastly improved. For example, instead of some of the current coursework projects, an Astronomical one could be well received as it creates a lot of interest into something that could interest a lot of people, whether they are interested in Physics or not. Astronomy is one of the areas of Physics that i believed is under taught as it is something that will grab students attention and show them some of the more interesting, fun and hands on aspects of Physics. Astronomy also does not need any equipment and can be done at home as a hobby in later life.



A-level

Thinking about my future blog 10

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One Response to "Your experience of your physics A-level"

tamf10 Says:

February 9th, 2007 at 6:59 pm e



We do the OCR advancing physics course. It allows us to do our coursework on things that we are most interested so a lot of effort gets put in to the works and allows us to develop skills such as public speaking, doing presentations to the class. These are all good skills and will be valuable to me in the future. However, the physics course can be a little dull. Most lessons are theory and we are being told about things which we have no interest. Also lessons of just writing notes is very boring! More practicals with some fun element could be incorporated, however I do know that the work has to be done. A lot of teachers also can be quite dull, and themselves seem quite disinterested in our lessons which doesn't really encourage us to be inspired.



GCSE

Thinking about my future blog 13

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One Response to "Your experience of your GCSE Physics"

tamf13 Says:

February 8th, 2007 at 9:51 pm e



In general i have found physics to be one of the more enjoyable sciences at GCSE level. It addresses many topics of interest as they pertain to everyday life and the way things around us work. However, topics such as circuits seem to drag on and it feels like too much time is spent on it. I enjoy seeing the practical experminets. Another downside is the amount of formulas needed to be learnt for the final exam as they play a huge part. It is very mathematical which is not a strength of mine. For this reason i am not taking Physics for A level.



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