Advance HE STEM Conference rough notes

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1 Keynote: Warwick institute for employment research

The coming of the robots - how likely is AI to take high skills jobs? In particular - Will STEM jobs be safe? Digital disruption will affect work and policy across a matrix.

Type	Labour issue	Public policy issue
Production	human labour substitution	basic income, skills
Products	Commodification of unpaid labour	e.g. likes & privacy, human rights, IPR, Tax
Workers	Harvesting behaviour data	privacy, human rights
Work	Eradication of employment	Flexicurity, tax. Uber etc.

Robots arrival might involve the death of the job, a life of leisure ... This argument has been going on for a long time - quote from a book by Clive Jenkins from 1979, predicting that the microchips will take our jobs. there will be residual jobs in technology and science, education, doctors and dentist, and enlighteners and entertainers (playwrights and clowns).

Questionnaire: CIPD questionnaire 2019 about job creation / elimination with respect to AI

Has AI created jobs? 43% yes - 39% high skilled 10% low skilled Has Tech replaced jobs? 40% yes - 44% low skilled 29% high skilled

Which jobs are likely to go? Most likely: high skilled professional and admin. Does it affect job quality? Hard to say. What's job quality?

From my perspective this was a generally interesting talk but it felt one-step removed from actual AI practitioners. It's all surveys of the opinions of people who run businesses which might use AI and which employ people, rather than people who understand the AI.

2 Championning inclusion with students as partners

Championing inclusion: Working with students as partners to effectively inform learning and teaching development

Ms Helen Ordidge, Aston University

Are students apprentices, customers/consumers, partners or what?

In Aston, employability is king. Wanted to move from listening to partnership with respect to the student voice.

Existing avenues for student feedback were not doing this (ssccs and so on) "Student experience champions" employed to bridge the gap between formal schemes and the student body. Provide a sounding board, and real-time feedback. This was "incentivised" by being a paid role, which led to interaction

with un-engaged groups.

Role models: staff diversity doesn't always match student diversity. Important for the student experience champions to reflect better.

Projects undertaken by these Student Experience Champions: Student project showcase, focus groups, sessions on effective personal tutoring delivered to staff by a student...

Bonus features: shared best practice, partnership working, supporting course reps, longer term projects and thoughts that aren't as *reactive* as SSCC reps.

"Finding solutions to complaints is a lot more fulfilling than joining in with the moaning" David - Student experience champion

Questions: Students were paid minimum wage, worked towards projects which were agreed, couple of hours a week.

3 Sense of belonging

Undergraduate sense of belonging in a Science department

Dr Rebecca Barnes, University of Sheffield

Programme level approach - getting people out of their "module silos"

Belonging involves feeling accepted, valued, included, and encouraged and feeling oneself to be an important part of the life and activity of the class (Carol Goodenow 1993). Lots of people have suggested belonging is important for success and retention, not just enjoyment.

Survey in class to determine sense of belonging - surveyed frequently in L1 and in week one of L2, 3 and 4. Pulse survey on workload, enjoyment and belonging every week, L1, L2, and L3. 5 questions. Also focus groups.

Generally, there's an increase of sense of belonging over time (from L1 week 1 through to L4 week 1). Weekly pulse survey - there's a bit of variation but no clear trend.

Feeling of belonging decreases during year and indeed is inversely correlated with workload.

White british students feel more at home than other students. I feel at home in this university: white british > not white british > not uk I have found this department to be welcoming: white british > not uk > not white british.

Non UK students reported higher levels of engagement.

Women students report lower self confidence.

No clear idea about how to actually change things but... good to know the situation.

4 Peer friendship groups and attainment

How peer/friendship groups form, and their effect on attainment

Dr David Smith and Dr Melissa Lacey, Sheffield Hallam University

Who are students interacting with?

Give map of LT. Mark with an X the seat you're sitting on.

If you're interested in participating give me the student number.
Tell me why you're sitting where you are.
Written responses

- In the middle:
  - Want to be with friends.
  - Want to be with my course mates.
  - Enough room for everyone in friendship group.
  - Space at front.
  - See without straining (at back and at front) - ability to hear also happens around the theatres.
- At the edges:
  - Left handed people at the front (there's a bench)
  - Can't be bothered to walk up the stairs
  - Would prefer nobody behind me (anxiety)
  - Would prefer nobody behind me (don't want converstaions to distract)
  - Like being at the ends to escape
- At the front:
  - Want to engage
  - Want to have interactions
  - Easier to have conversations to the lecturer
- At the back:
  - Don't have to engage
  - People are forced to participate at the front and I don't want to

Does it matter where they sit for grade boundary? Nope. No pattern whatsover with individual work. With groupwork, links exist between marks for friendship groups.

How are the groups forming? Two types of student groups - Swans and Dolphins. Swans work solely together - effectively they pair off at the start of the degree and work with the same partner. Dolphins work in interchangeable groups like pods - there's a collection within the cohort who may work together in pairs, and the pairs will drawn from the pod, but change from assignment to assignment. Do these affect attainment? Nope. Swans and dolphins do pretty much the same. Good students drag each other up whether they're working in pairs or in groups. Bad students drag each other down similarly.

High acheiving dolphin groups don't mix outside their group; high performing swans do mix outside.

Why did you form the group/pairing? Low attaining groups - similar background. High attaining groups - similar level of attainment.

Generally - interesting talk. Would like to read the paper.

`https://febs.onlinelibrary.wiley.com/doi/full/10.1002/2211-5463.12494`

5 Constructive Conversations around Inclusion

Jan Peters - Katalytic Workshop

How can we make Engineering inclusive? What if this is as good as it gets?

Culture -> Content -> Delivery -> Practice

How you work -> What you teach -> How you teach -> How you rehearse and professionalise what you're doing

Tinker, tweak, monitor, adjust, repeat. You don't just redesign a car; changing performance and culture wrt inclusion needs to take the same approach.

What is culture? Is it that there is a kind of person and you have to make adjustments for everyone else? Is it assumptions? Is it "the way we do things around here"? Or is it the way we'd like to do things? Is it the pictures on the walls? Is it about what it's OK to say or is it the things that people try not to say (but you know they want to)?

What artifacts represent our culture? What things can we change? What do we want to work on?

Next we looked through a set of cards with various EDI suggestions and had to sort them into "always", "sometimes" and "never"; these were all rather policy-level so I wasn't so sure where things lay, and it all felt a little Athena Swannie. The idea was to work out what we currently do well around inclusion, what we'd like to address next, and what objections there might be to taking that next step.

Through thinking things through in this way the idea was that we'd anticipate the objections to the next policy move we wanted to make, and then consider responses to these.

6 Towards a manifesto for inclusive STEM education

Clem Herman (Open) Lisa Thomas (Lancaster)

What would an inclusive curriculum look like? The workshop drew "rich pictures" (which are doodles based upon a theme, as far as I can tell) to show what an inclusive STEM education would look like. I wasn't convinced by the rich picture stuff, but then the various groups fed back and suggested ideas about what an inclusive STEM education would look like there were a lot of good suggestions - here's the list.

- Inclusive STEM education is for everyone
- Includes diverse stories - seeing others like yourself
- Recognise individual well being
- Is interdisciplinary - connect with other subjects
- ItâĂŹs creative
- Many routes in, regardless of age, gender dis/ability
- Flexible entry - lower the barriers, be more flexible
- Many modes of learning -media and environments
- The image problem - not just prospectus / websites
- Allows failure and achievement - experimentation encouraged
- Eliminate bias - decolonise the curriculum- considered who gets cited and published - whose knowledge is represented
- Collaborative and social learning - provide support and buddying
- Technologies need to be designed for inclusive approach
- Accessible and affordable
- Intentionally and consciously inclusive
- Needs to be designed in
- projects and assignments - build in inclusion to the brief
- Without borders

7 Are we giving undergraduates enough guidance about how to read research papers?

Dr Trevor Day, Royal Literary Fund

This workshop session looked at the different ways that researchers and students read papers and asked the question - what guidance do we give? And is it fit for purpose?

The interactive elements of the workshop involved looking at the way in which we introduce papers to students at the moment. Do we ask them to read on paper or on screen? What do we tell them about the paper structure? etc. etc.

It seems that there are real disciplinary variations in what we tell students about reading. Maths and computer science people didn't really introduce undergrads to many original research papers; at least not without previously going

through the content of the paper and maybe even some code. In other disciplines (biology, for example) it seemed as though first year students were introduced to research papers very early on.

8 BRIDGE - building routes into degrees with greater equality

Professor Rebecca Strachan, Northumbria: Joint project with Gateshead, Derby, Northumbria funded by the Office for Students.

Construction sector is about 10% of the UK economy but has a skills shortage around grad roles, and is one of the least diverse sectors in the UK (4% BAME, 13% women, women mostly in office jobs).

Why diversity? well, skills gap innit.

Two stage project - find out what the barriers are, try to do something about it.

Issues and barriers?

Sector image is poor: blue collar, harmful to environment, dangerous, dirty.

Culture: long hours, competitive, adversarial, masculine model.

Career Knowledge: parents, teachers and children believe it's all bricklaying, joinery, decorating. Jobs often filled by word of mouth - incestutous.

Technology: Lack of awareness of the hi-tech nature of constrution amongst the general public.

Making change - theory of change

Break down the things you want to do into long term aims, mid term, short term, and work out what actions and stakeholders can help or be relevant.

Themes: Image, culture, influencers, recruitment, career knowledge, tech.

Example 1: Recruitment: planBEE is employer led program at Gateshead, with employers offering a set of four * six-month placements. Worked with planBEE team to diversify the recruitment material, and worked with employers to change recruitment, did unconscious bias training, tried to get gender balanced panels for interview. 8% to 27% women 2016-2017 (wow).

Example2: young people: Trying to reverse stereotypes through workshops and inerventions. Hard to determine success here but seem to have changed ideas about safety, for example.

Example 3: unconscious bias: Audit of images and wording, delivered unconscious bias training to industry and university staff. Hard to get the unwilling to engage with training, hard to work out audit of images, particularly with just counts. Need to look at centrality (if BAME images are in sweatshops or in supporting roles, for examples).

9 Effective engineering provision for contemporary students

Dave Knapton, Sunderland.

46% of companies report recruitment difficulties due to skills shortages.

Many educational routes into Engineering and routes to professional registration - getting to CEng. Theoretical knowledge, application, accountability, interpersonal skills.

Fab labs, maker faires, STEM ambassadors, school outreach... what should the higher education sector be doing *in the classroom*. STEM enrichment has caused a real boost; over 50% would consider working in engineering. Need to ensure that expectations match reality, however, as STEM enrichment concentrates on the fun stuff.

UTCs in England provide approach to more technical education. Survey of engineering motivation shows little difference though between comprehensive and UTC students. The main talk explored the nature of UTCs and the academic/vocational split - for engineers we need both sides of the academic and vocational divide.

10 Understanding the importance of creating an inclusive timetable in the age of the commuting student

Nigel Page, Mark Bonetszky, Gary Forster-Wilkins (Life Sciences, Timetabling, pharmacy & chemistry, Kingston University).

BME students more likely to commute, felt more at home at school than at uni. NSS question about "timetable working for me" bad responses. How far do they live from University? 64% students are BME, with an average 7 mile journey. White students 3.5 miles.

Students travelling 1h40 on public transport to get to a 9am lecture, so leaving before 7am to get to the station.

Q16 NSS - timetable one - correlates almost perfectly with the travel time.

Enablers to help with this: clear day a week, later start, no single session days.

Challenges: narrow window of change (timetable has to be set in Sept and can't change), course pathways, physical space, H&S, number of parallel sessions (e.g. 300 students in 10 student tutorials takes a lot of time).

Timetable KPIs: can we see if students are coming in for 1 hour sessions - if so we can try to move that. Are they doing more than 6h a day? Do they have more than 4h in a row? Hopefully this will impact on NSS questions. It's expected that commuting will also affect things like feeling at home in the university.

11 How accessible is the STEM post-16 education provision in UK, and what are the implications for the HE Computing and Engineering programmes' pipeline?

Dr Anne Nortcliffe and Mrs Roz Barley, Canterbury Christ Church University and Mrs Jacqueline Stallard, Sheffield Hallam University

"Local university for local people" - both Hallam and Canterbury CC are local unis pulling mostly from the local community.

What's the pipeline? Demographic blips are problematic. If you require maths, you're not going to get many women. If you require further maths, you're really not going to get many women (0.9%).

When you look at actual numbers doing A-levels there are very few. There are real hotspots; if you want to to physics it's Maidstone for example. Foundation degree allows a second chance particularly in situations where the A-level isn't there.

Conclusion - STEM A-level provision looks good but in reality it's patchy. Foundations can fix that, and also open up other demographics (mature).

12 Self-efficacy: Empowering diversity in STEM recruitment

Dr Philippa Boyd and Associate Professor Maria Vahdati, University of Reading

A bunch of posters have been used to advertise engineering. This talk covered a project which showed these posters to kids who are in the target audience by polling pupils at a girls' school.

What the girls saw as a good poster didn't really match up with what the adults saw as a good poster. Other conclusions - old people read posters more. Kids see them as adverts. Posters are wallpaper. Quote: the only posters I see are the ones which say SALE 50% OFF.

13 Inclusive Engineering

Professor Kate Sugden, Aston University

This was a project to get engineering students to think about inclusivity. By moving from diversity to inclusion it seems people are less threatened by the concepts.

Inclusive Engineering = better products and services -> Inclusive Mindset = unlocks EDI in other areas -> Inclusive Culture = more attractive jobs and better retention -> Inclusive recruitment and management = more diversity

They have a nice website at `http://www.inceng.org/`

The aim was to get engineers to consider inclusion as a core competency - like safety. Develop an inclusion mindset.