Fostering Improved Training Tools for Responsible Research and Innovation

Liverpool Experiment

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Aims of the experiment

- To explore and discuss ethical and science education issues with various stakeholders and how they perceive these, using the optical monitoring system as a case study research project
- Identify other ethics related issues/challenges that impinge on the research
- Increase awareness of different perceptions and view of ethics
- Identify any weaknesses, misconceptions, omissions, barriers, communication issues, in science education within the research institution, industry and society,
- Explore the understanding and perceptions that stakeholder have of science education
- We hope to identify issues that can lead to the improvement in the way science education is delivered/communicated in the institution and community and the way in which researchers embed ethics into their research.

Case Study Research

Optical Monitoring System

When we conducted our focus group we asked the participants to not only think about research and innovation they had been involved with but also to think about how they would embed RRI ethics and science education into an ongoing research study.

We explained the Optical Monitoring System research and asked the participant what the ethical barriers and challenges would be with this research in mind.

Stakeholders

Internal

- PhD Researcher x2
- Director of Ethics
- Senior Researcher Ethics and Integrity officer x2
- Strategic Planning and Governance
- Experienced researcher in technology

External

- Liverpool clinical commission group. Clinical commissioning
- Liverpool City Council. Provider of social care.
- small to medium sized enterprise manufacturer, provider of health care solutions x6
- eHealth Cluster lead
- Freelance consultant to the eHealth cluster
- Potential user/beneficiaries of the technology

Methodology

- Initial questionnaire
  - Questions asked to gain a benchmark for understanding of RRI, ethics and science education
- Focus group
  - Participants came together to discuss opinions and views on RRI, ethics and science education
- Interview
  - One-to-one interviews to reflect on how individuals can make changes within their role and what they can do moving forward
- Workshop
  - Learning opportunity to further develop understanding of RRI, ethics and science education
- Final questionnaire
  - Repeat of the first questionnaire to measure development of understanding

Over view of results

First questionnaire identified

- Participants perceptions
- Understanding of ethics and science education
- Motivation to implement ethics and science education
- Engagement with the quadruple helix groups during research

Focus group feedback

- Good mix of view and perspective of ethics and science education
- Highlighted barriers and challengers
- Participant left feeling they use RRI and OS in current roles
- Gave them a chance to reflect on their own views of ethics and science education

Overview of results

Interviews summary

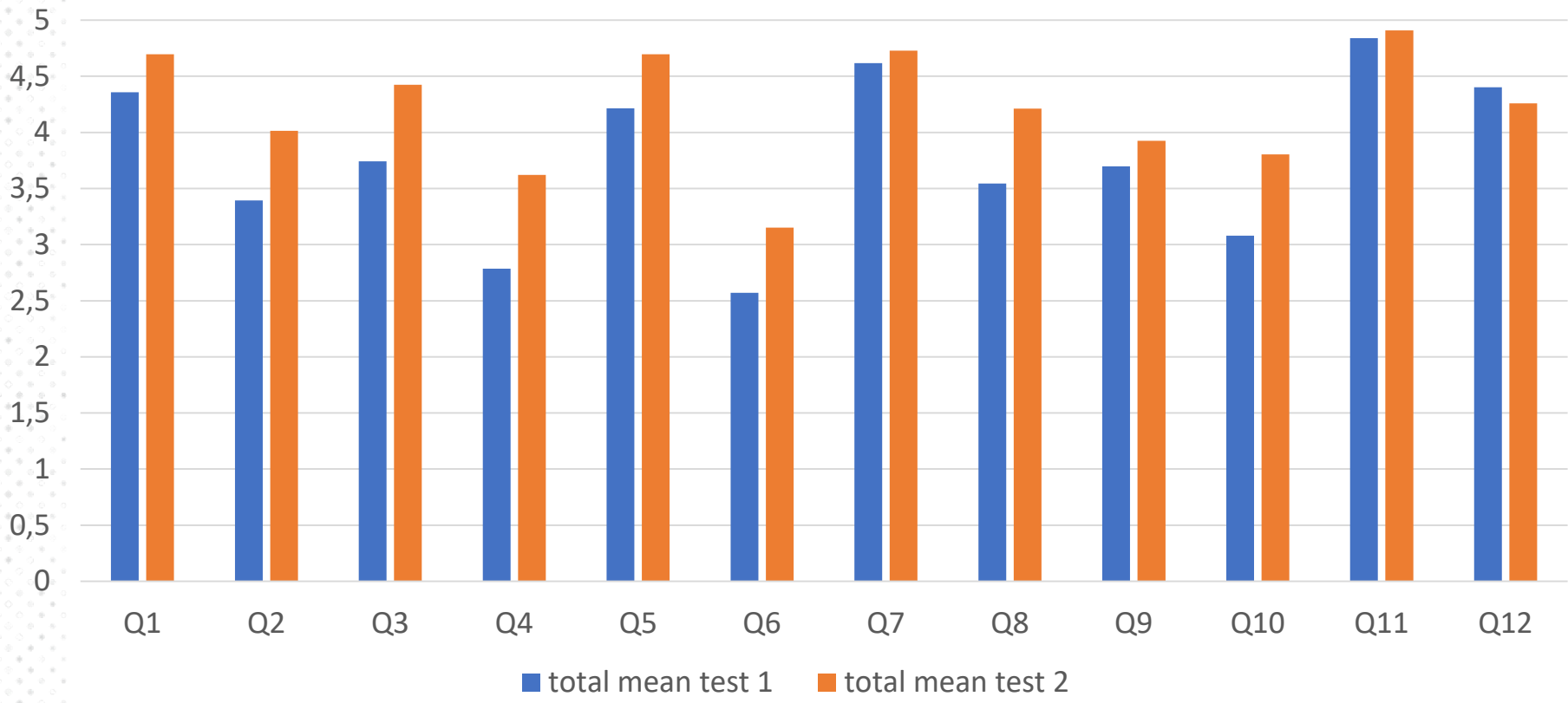
- Highlighted was the importance of knowledge exchange when working with a quadruple helix
- Co-design of the monitoring system and other technology innovation would lead to the end-users having an input
- Ethics need to be communicated better to all stakeholders involved
- Collaboration is a two way relationship that keeps society informed on research and innovation

Workshop feedback

- Practical way to illustrate challenges
- Learnt different interpretations of ethics and science education
- Gave participants plenty the think about moving forward
- Displayed how RRI and OS can be incorporated into future projects

Outcomes

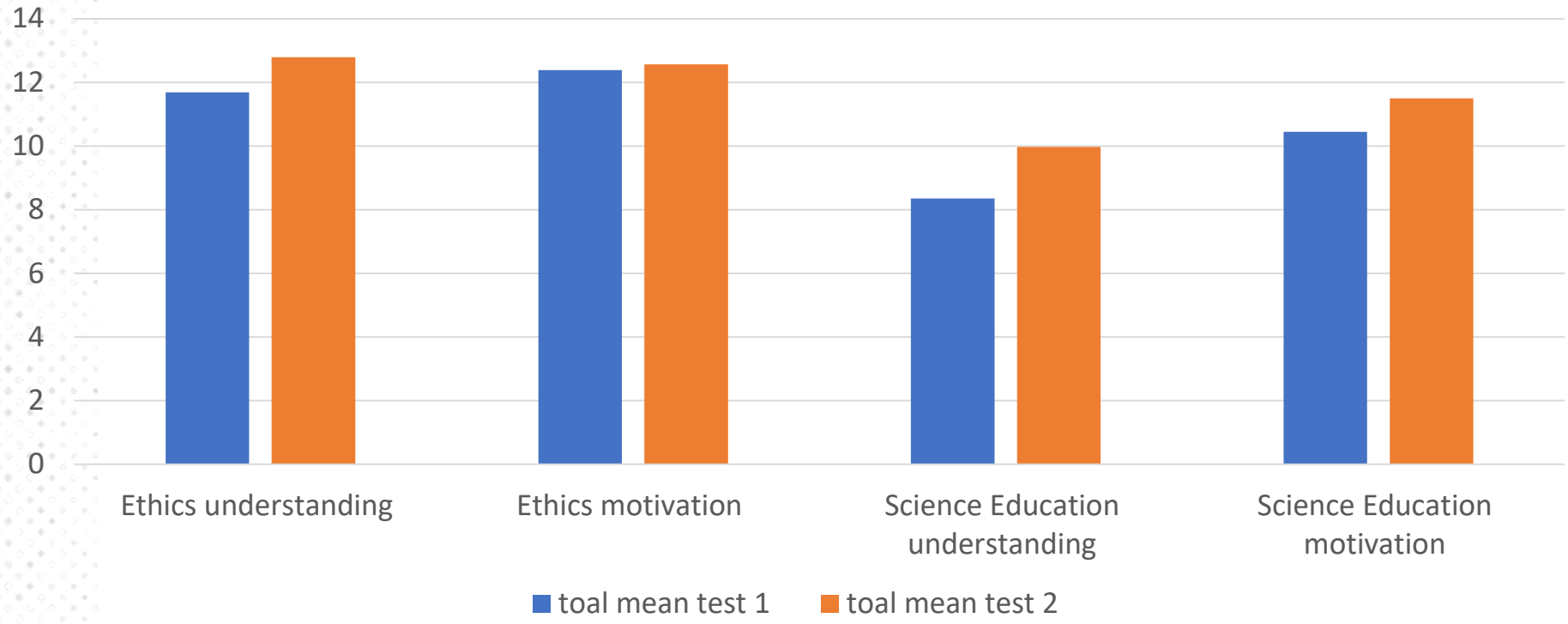
comparison between first and final questionnaire



The mean value for each question that was measured on a 5 point scale, for the whole cohort. The changes show, most improvement in question 4 – implementation of science education and question 6 – awareness of science education policies.

Outcomes

comparison between first and final questionnaire

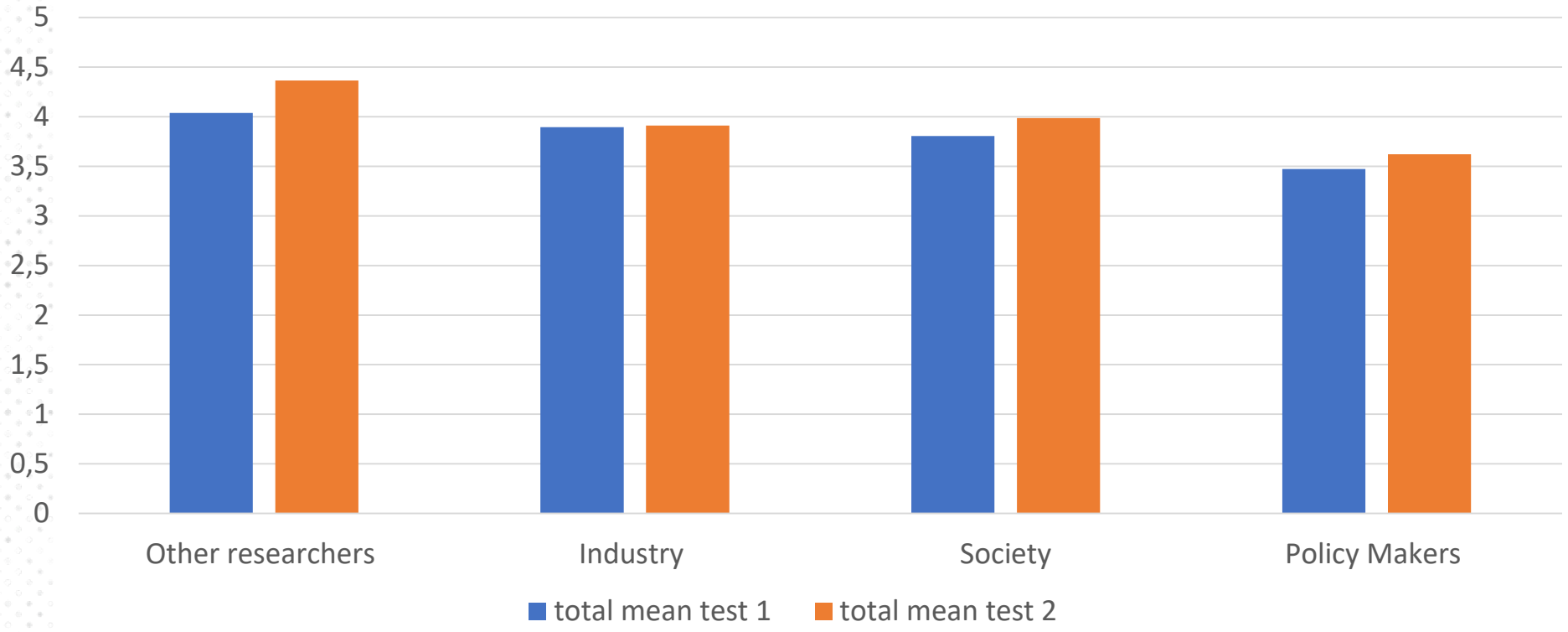


Sub groups of the questions were added together giving a maximum possible answer of 15. Then the mean for each group was calculated for the whole cohort.

The changes between the 1st and 2nd questionnaire for each sub group of questions show science education understanding has vastly improved.

Outcomes

comparison between first and final questionnaire



Results show the changes in the level of engagement the participant would have with the quadruple helix in their research project. The changes show a slight improvement in all areas with 'other researchers' showing the highest improvement.

Summary of findings

- The results show overall, all participants improved in their attitudes towards ethics and science education understanding and motivation of implementation.
- The results also show improvements in attitudes towards involving various stakeholders in all stages of research.
- Some participants are still unsure of who they would contact with regards to implementing ethics and science education. this was measured using yes and no questions with results not having a significant change from test 1 to test 2.

	Test 1		Test 2	
	Mean	SD	Mean	SD
Ethics understanding	11.6	3.5	12.7	3.9
Ethics motivation	12.3	3.2	12.5	3.9
Science education understanding	8.3	2.8	9.9	3.2
Science education motivation	10.4	3.4	11.4	3.3
Engagement with other researchers	4.0	1.6	4.3	1.5
Engagement with industry	3.8	1.6	3.9	1.8
Engagement with society	3.8	1.9	3.9	1.7
Engagement with policy makers	3.4	1.8	3.6	1.9

Main challenges

- Gaining ethical approval earlier may have lead to earlier interactions with the stakeholders, enabling us to build better relationships
- Building better relationships to better understand how to motivate the stakeholders to engage with all aspects of the project
- There was a lack of awareness for ethics within the culture, this may have contributed to the low uptake of participants
- Ensuring the focus group and workshop was more accessible by holding them in a different location may have enabled more participants to attend

Lessons learnt

- Raising awareness before the start of the project may have lead to more participants taking part
- Having end users of the monitoring system would of helped the researchers and innovators better understand what the public want from research and innovation and how it directly effects them

Next steps

- Mandatory ethics and RRI training for Post Graduate Researchers is being trialled in the school of Electrical Engineering and Electronics and Computer Science at the beginning of next semester
- The research conducted is being show cased at a Love Data event in February. This event is a collaboration between the University of Liverpool and Liverpool John Moorse University.
- Writing of an Academic paper
- Further dissemination through the university and community at up an coming events