

# Evaluation of impact of ESTABLISH IBSE Teacher Education Programme on participating teachers

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Science  
Teachers

The diagram features a light green curved background at the top. Several overlapping, light gray curved lines with circular nodes are scattered across the white background. A prominent blue arrow points from the text 'Science Teachers' on the left to 'Teachers using more Inquiry' on the right.



Teachers using  
more Inquiry

Science  
Teachers



ESTABLISH  
Workshops

Teachers using  
more Inquiry

- personal beliefs and their own education  
Eick and Reed (2002)
- educated under concept-based programmes  
(knowledge without context)  
(King, Bellocchi, & Ritchie, 2008).
- core conceptions  
(Lotter, Harwood, & Bonner, 2007),

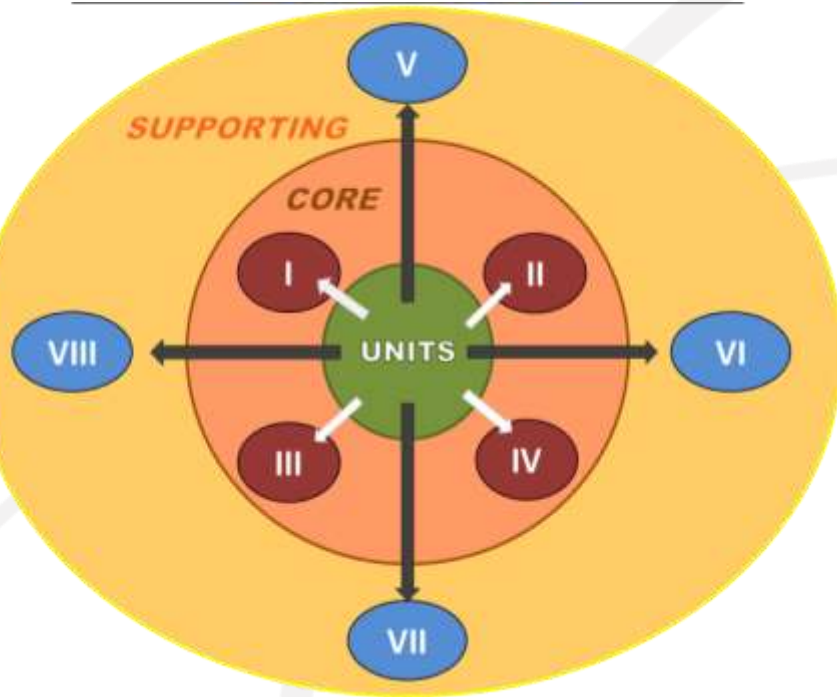
Science  
Teachers



**ESTABLISH**  
Workshops

Teachers using  
more Inquiry

# ESTABLISH Framework for Teacher Education



## Additional elements V-VIII

- I. ESTABLISH view of IBSE benefits to learning, role of inquiry in curriculum, provide direct experience of inquiry, ethical issues
- II. Industrial Content Knowledge (ICK) industrial linking – provision of authentic experiences informed by industry or real applications
- III. Science Teacher as Implementer implement inquiry teaching /learning in their own classroom.
- IV. Science Teacher as Developer evaluation of classroom experience; start on the process of changing their own materials into inquiry based materials.

# Methodology

Understanding of Inquiry  
Attitudes towards inquiry  
Industrial Knowledge / links  
Inquiry Practices  
Inquiry Skills  
Classroom Practice

Developed  
Questionnaire(s)

pre-service  
in-service

Before and after  
Teacher workshops

Profile of  
in-service  
teachers

# Data Analysis

## Teachers self-rated as:

A complete beginner (B)

To have some experience (SE)

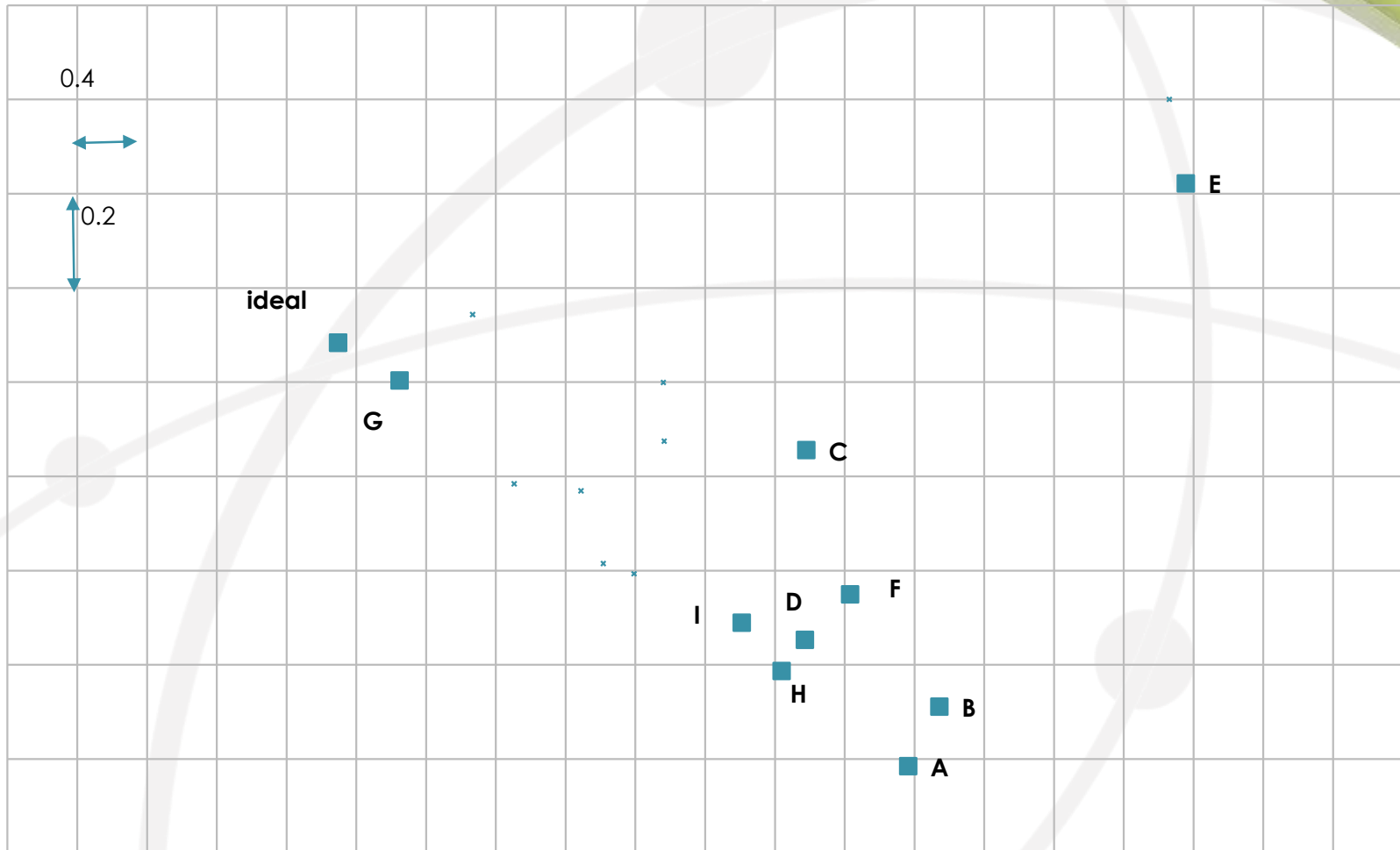
Very experienced (VE)

Data coded and subjected to Multidimensional analysis (MDS) which examines similarity/dissimilarity between data.

MDS was used to compare the dissimilarity between the different country groups by using the country average response for each question as the input for MDS.

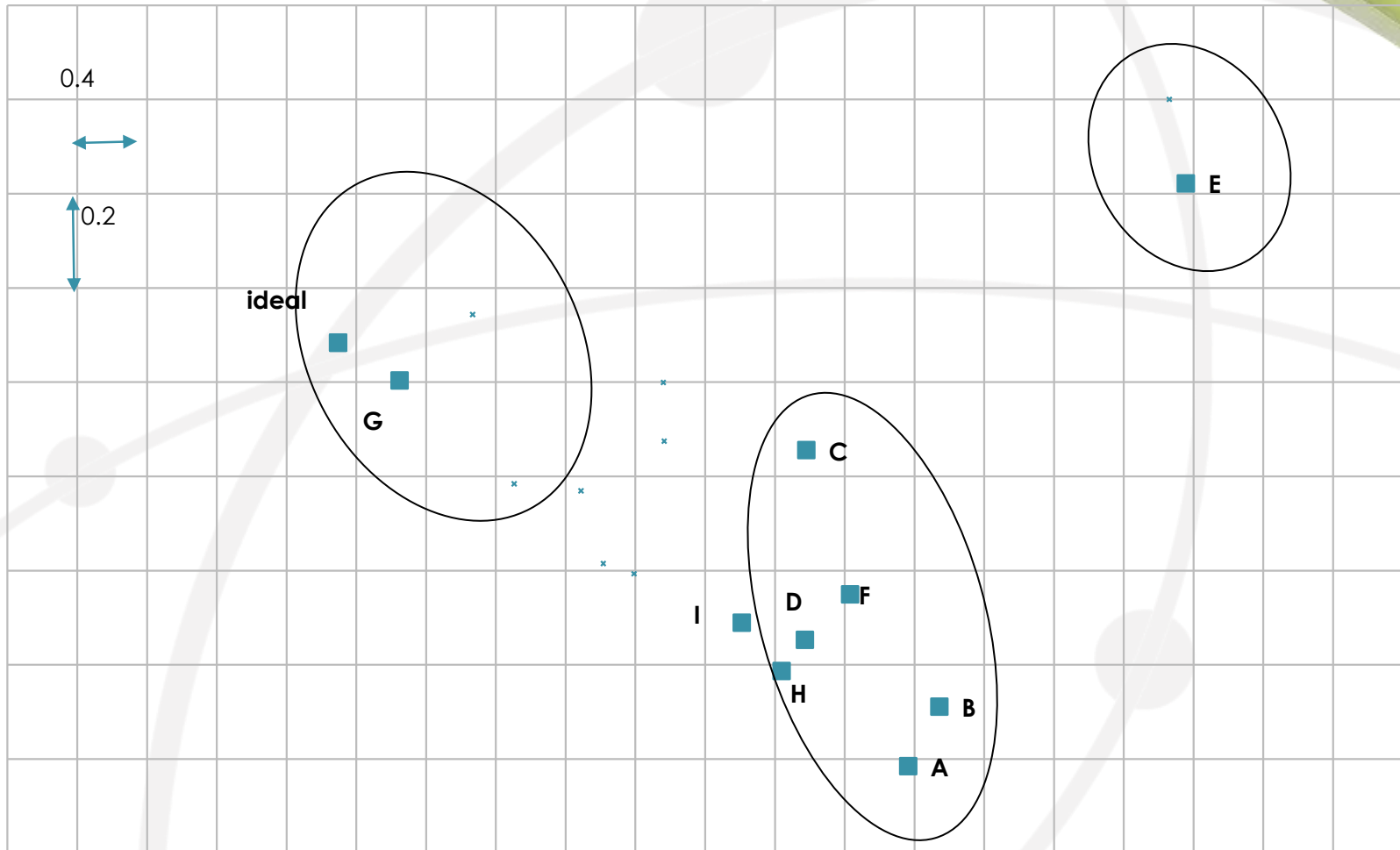
The distribution of the responses based on each teacher cohort was then mapped relative to an 'ideal' response.

# Understanding of inquiry

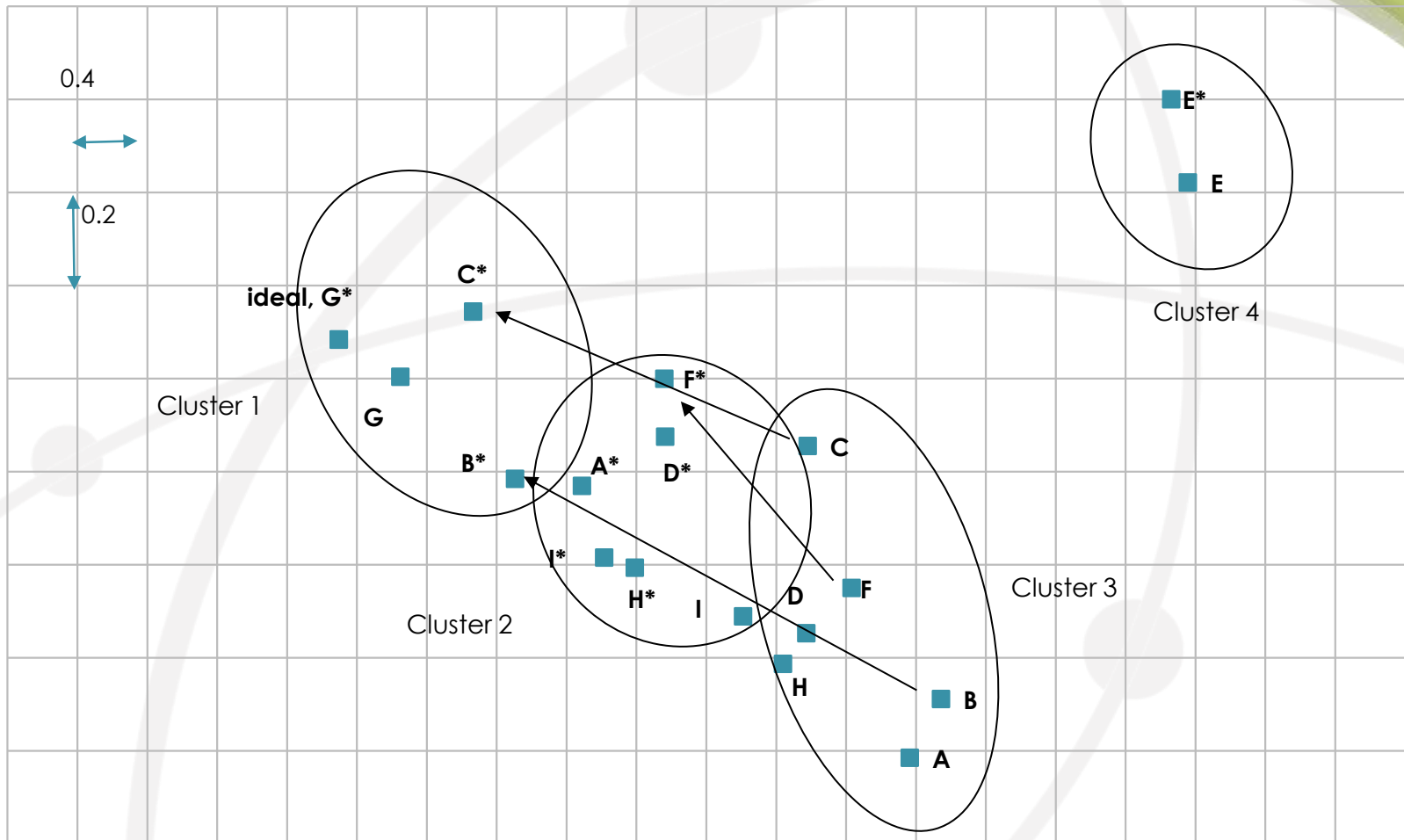




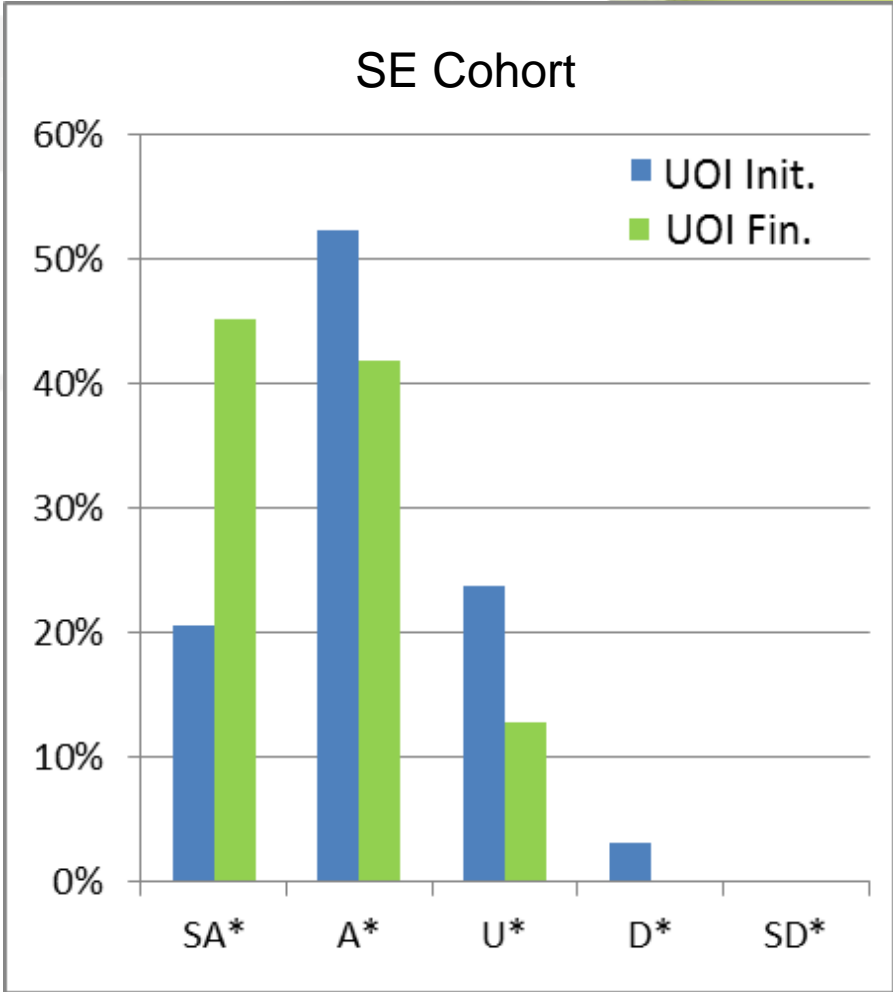
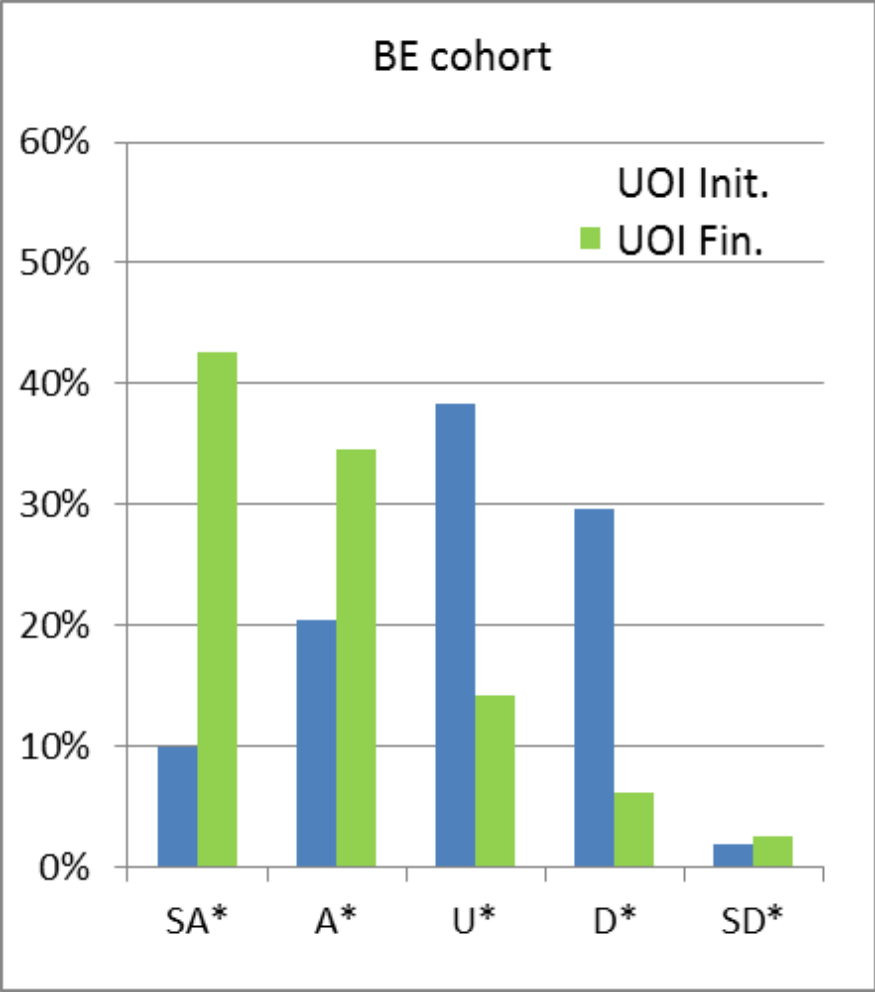
# Understanding of inquiry



# Understanding of Inquiry



# Agreement with IDEAL for BE and SE cohort

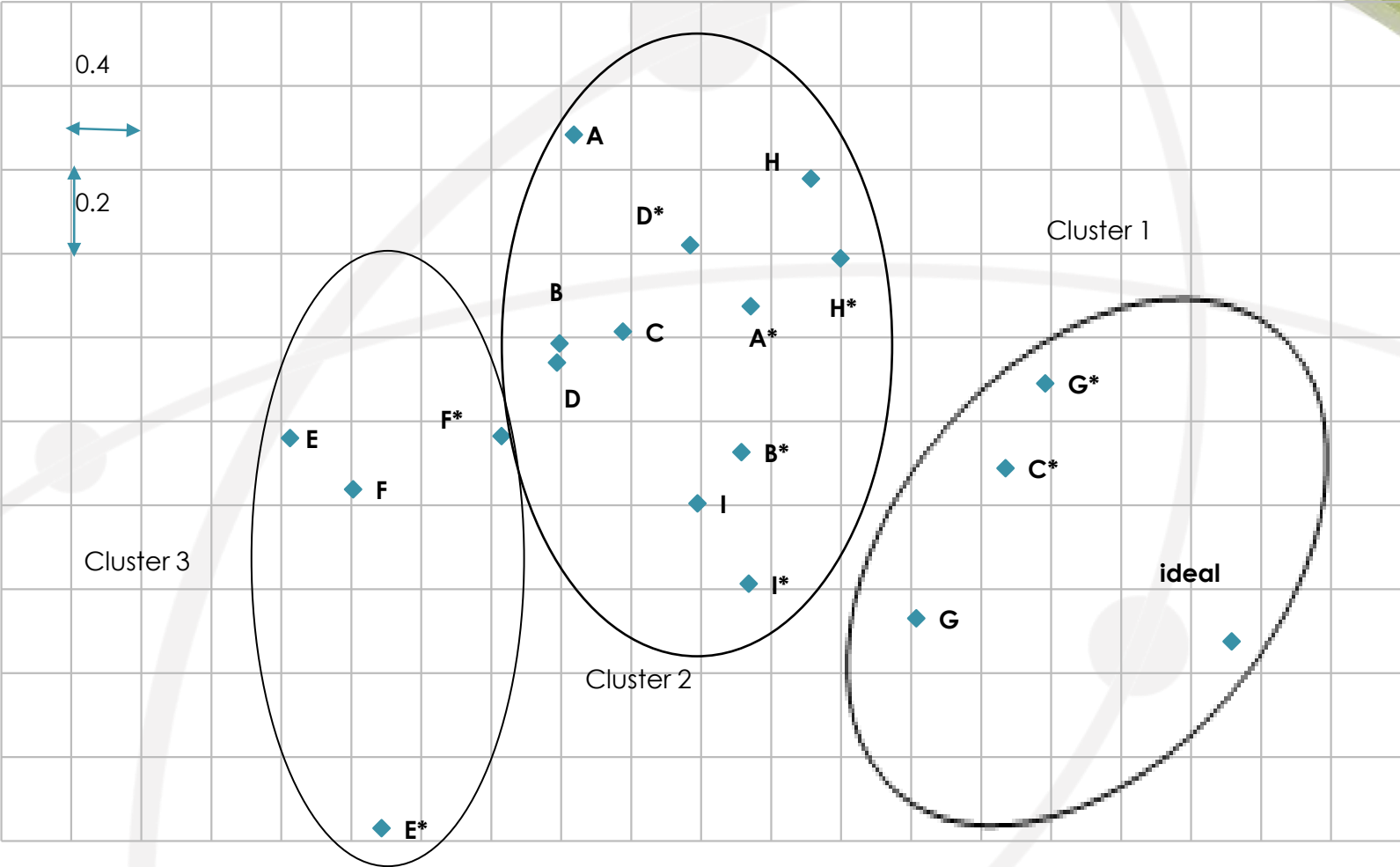


← Agree with IDEAL

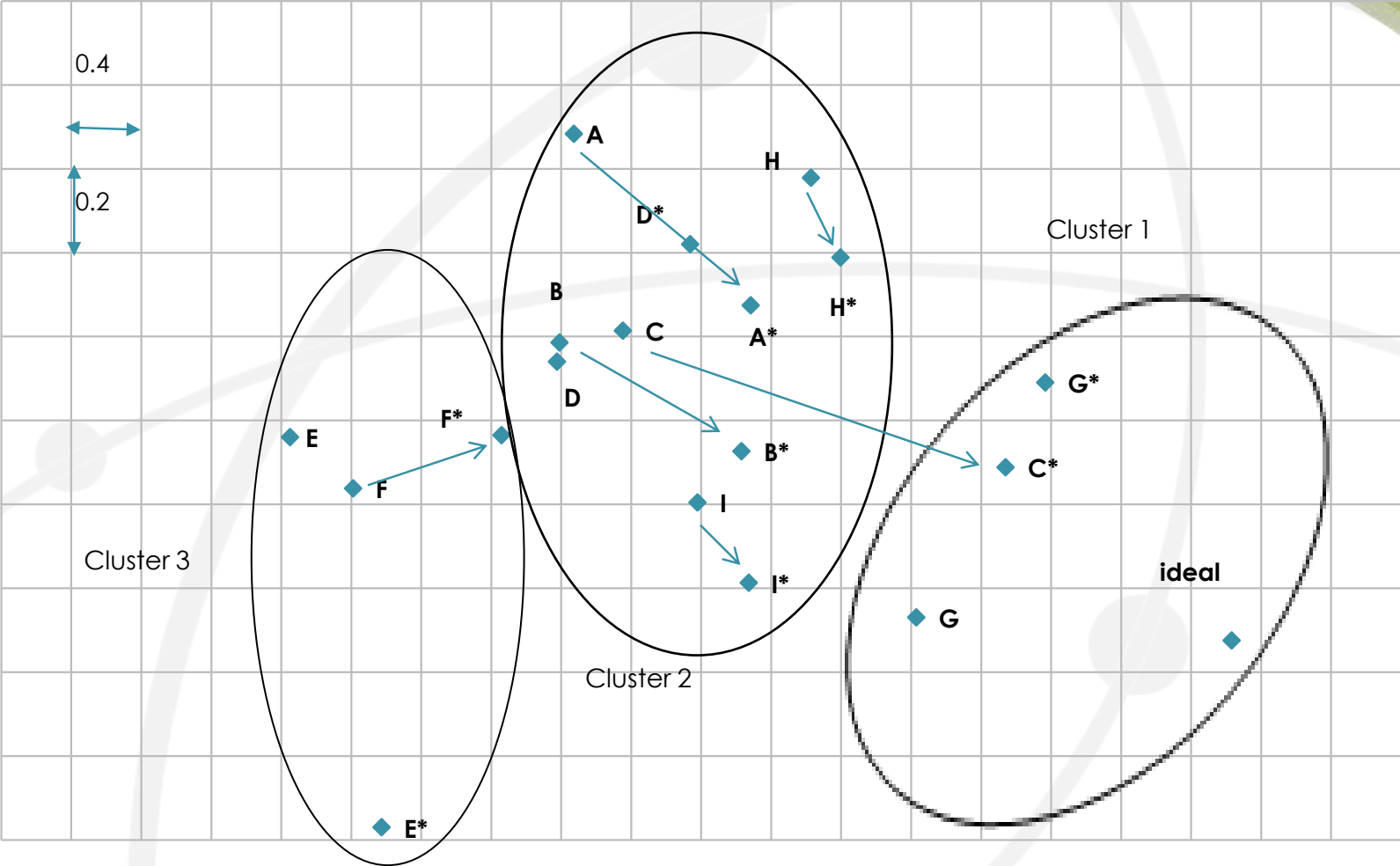
# Attitude towards inquiry

- I think inquiry takes up too much classroom time for me to implement;
- The use of inquiry is appropriate to achieving the aims of the curriculum;
- Inquiry based teaching is only suitable for very capable students.

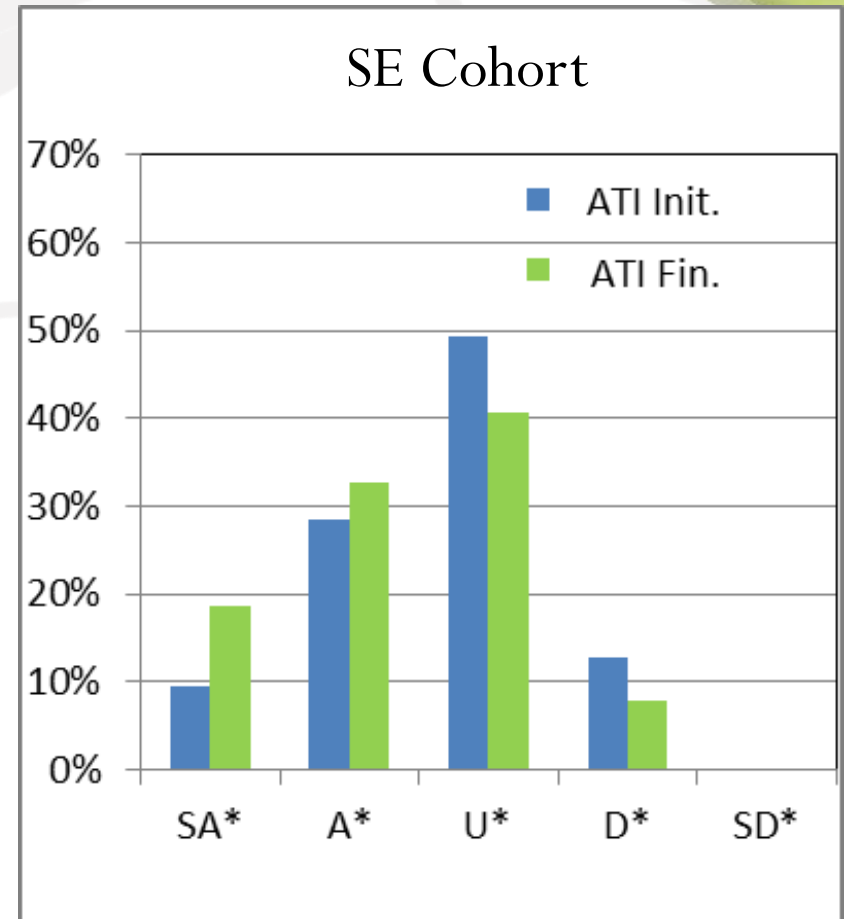
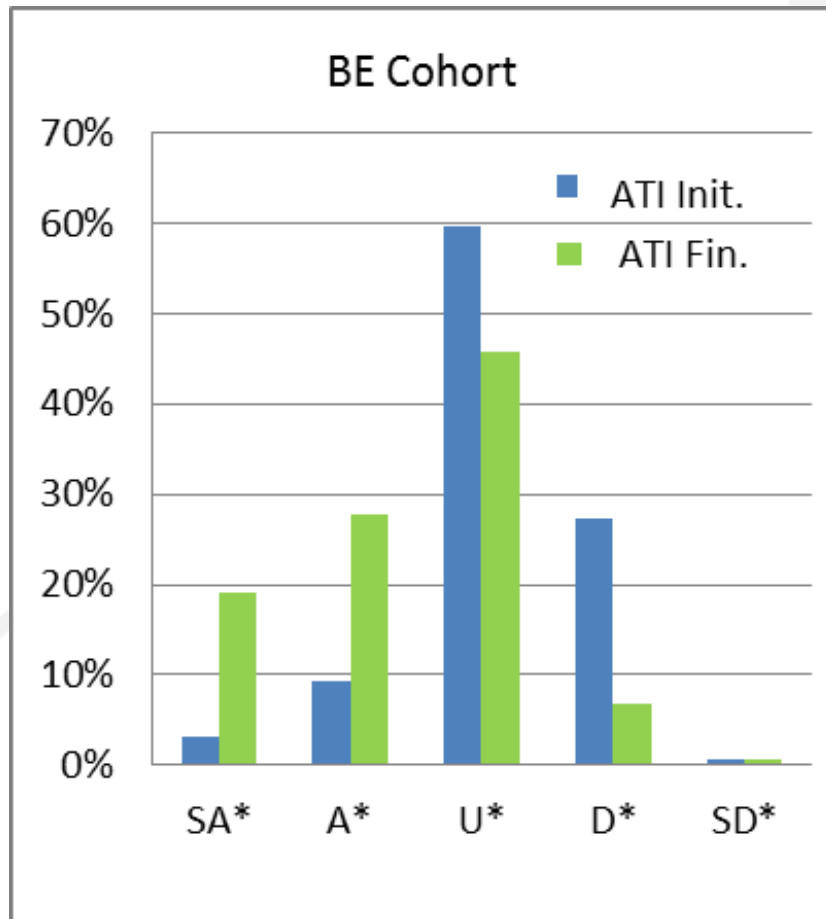
# Attitude to Inquiry



# Attitude to Inquiry



# Attitude to Inquiry



←  
Agree with IDEAL

# Beginner Profile compared to Very Experienced

- View science as static body of knowledge and more unsure of the nature of science;
- Adopt more factual approach to teaching science;
- Classroom management with different activities a potential issue;
- Lack scientific knowledge to relate classroom science to outside phenomena and to teach by inquiry
- More unsure of themselves in terms of their scientific knowledge base, their degree of comfort dealing with unknown within classroom
- Are not as happy with their current teaching method, but are willing to try other teaching methods but are more apprehensive about changing teaching methods.



## Conclusion: BEFORE TEP:

Practices associated with inquiry more difficult for BE teachers:

- more likely to 'tell the students the right answer/result' in an investigation
- more uncertain of how to ask 'higher order questions that promotes thinking'.
- managing a classroom where each student group is doing different activities is difficult
- many feel uncomfortable with teaching areas of science that they have limited knowledge of and of asking questions that they do not know the answer to
- feelings of inadequacy if they do not know answers to student questions.

## **Conclusion: After TEP:**

TEP effective in:

- increasing teachers understanding of inquiry and the role of the teacher and student in the inquiry classroom.
- more positive attitudes to inquiry
- Increased confidence in asking higher order questions that promote thinking and also their own science knowledge.
- Biggest changes in Beginners

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