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APPENDIX 3

GROUNDED THEORY GUIDE INTERVIEW QUESTIONS

This Appendix contains the final set of Physics Student Interview Questions developed in the grounded theory stage of this investigation.

Note : The chemistry student interview questions have been included for completeness although the results of this investigation are beyond the scope of this dissertation.

PHYSICS SECOND/THIRD/HONS/POST GRADUATE

Wave/particle duality

- Double Slit Experiment
 - Describe what occurs if you shine the light on the slits?
 - Draw/describe
 - What features of this relate to quantum mechanics?
- What separates a wave and a particle?
- What is meant by Uncertainty?

Duality

- Evidence of wave particle duality
- Key ideas, experiments

Tunnelling

- Barriers and Wells
 - Compare and contrast
 - Discuss Wave Function, Eigen Functions/Values, Probability Distribution Functions

TUTORS (*)

Difficulties

- What difficulties do you anticipate the students might have learning quantum mechanics?
- What tools do you expect students to have?
- What Analogies/Models do you use to explain quantum physics concepts?

Linking

- What links do quantum mechanics concepts have outside, EM shielding, Radioactive decay
- Application - Name three things quantum mechanics has given us?

Discussion Question

- Imagine you live in a universe in which the value of Planck's Constant, h , is much greater than 10^{-34} – say of order 1000. In this universe you would observe quantum phenomena in everyday life. Now imagine you are a hunter. Every evening a mob of Quantaroos (Quantum kangaroos) bound along a path that passes through a densely packed grove of tall thin trees (River Gums) into a clearing. You would like to capture a Quantaroo as it exits the grove into the clearing. You have a shovel to dig a hole or a trench, a tranquiliser gun and a net.

Epilogue

- Sequence of major concepts, changes in understanding.
- During the delivery of the course what did you feel you needed to understand?
- What do you feel the lecturer wanted you to gain from the course?
- What would you advise a new lecturer about teaching the course?

CHEMISTRY SECOND/THIRD/HONS/POST GRADUATE

Periodic Table

- When you look at the Periodic Table. What do you see?

Wells and Barriers

- Draw a square potential well and all the features (energy levels etc.).
- Discuss what is meant by Wave Function, Eigen Functions/Values, Probability Distribution Functions.
- Particle in a box is often referred to. From your own understanding what is it representing?

Structure

- Draw an atom.
- Draw a simple molecule.
- How would you describe the building blocks of matter?

Quantum Chemistry

- Molecular shapes
 - How would you explain the shape and structure of molecules?
- Spectroscopy
 - What can spectroscopy tell us about the nature of matter?
 - What does the intensity of spectral lines tell us?
- What is meant by term "uncertainty" in relation to quantum mechanics/chemistry?
- Electrons are said to have wave and particle properties. What does this mean to you?

TUTORS (*)

Difficulties

- What difficulties do you anticipate the students might have learning quantum mechanics/chemistry?
- What tools and knowledge do you expect students to have?
- What Analogies/Models do you use to explain quantum chemistry concepts?

Linking

- Application - Name three things quantum mechanics/chemistry has given us?

Epilogue

- Briefly sequence the major concepts and changes in your understanding.
- During the delivery of the quantum chemistry course(s) what did you feel you needed to understand?
- What do you feel the lecturer wanted you to gain from the course?
- What would you advise a new lecturer about teaching the course?

APPENDIX 3.....	110
GROUNDING THEORY GUIDE INTERVIEW QUESTIONS	110