**Respondent 1**

**1. Interdisciplinary Foundations and Scientific Training**

**Open codes grouped under this axial code:**

* Background in molecular biology provides advantages.
* Scientific background supports current work.
* Occasional application of molecular perspective.
* Chemistry relevant to specific ecological contexts.
* Interdisciplinary application of chemistry and physics in PhD.
* Value of foundational math skills.
* Emphasis on practical, numerical math over abstract theory.
* Foundational knowledge in biochemistry remains useful.
* Ecology seen as broad and interdisciplinary.
* No single biology degree fully prepares for all subfields.
* Broad education beneficial to research.

**2. Theory vs. Practice in Science**

**Open codes grouped under this axial code:**

* Perception of disconnect between theory and practice.
* Field experience revealed ecological complexity.
* Ecosystem complexity defies (theoretical) simplification.
* Challenge of applying mechanical models to ecosystems.
* Theoretical clarity perceived greater in physics/math.
* Reinforcement of theory-practice divide.
* Critique of overemphasis on theoretical models.
* Need for grounding theory in real-world phenomena.
* Disconnection between theory and reality.
* Awareness of conceptual vs. applied gap.
* Subjectivity in scientific interpretation.
* Experimental outcomes depend on methodology.
* Necessity of simplifying complex systems for understanding.
* Distinction between complex and complicated systems.
* Risk of misrepresenting complexity through simplification.
* Simplification is inevitable but imperfect.

**3. Scientific Knowledge as Cumulative and Evolving**

**Open codes grouped under this axial code:**

* Incremental understanding through abstraction.
* Scientific method relies on isolation of variables.
* Limitations of holistic analysis in scientific practice.
* Advocacy for layered scientific comprehension.
* Concepts deepen with advanced study.
* Scientific learning is cumulative.
* Need to acknowledge cumulative scientific knowledge and abstraction in scientific learning.

**4. The Nature and Communication of Science**

**Open codes grouped under this axial code:**

* Scientific writing involves narrative construction.
* Overinterpreting scientific titles.
* Misalignment between headline and paper content.
* Scientific conclusions require contextual understanding.
* Conclusive titles lead to misunderstanding science.
* Broader societal misperceptions of science.
* Scientific conclusions serve context-specific goals.
* Scientific career reshapes perception of scientific truth.
* Science perceived as both an art and a process.

**5. Supervisory Role and Pedagogical Boundaries**

**Open codes grouped under this axial code:**

* Insight into professional boundaries in supervision.
* Challenge of balancing collegiality and supervision role.
* Priority of supervisory responsibility.
* Key supervisory lesson: defining role boundaries.
* Acknowledgement of the value in being approachable.
* Friendliness must align with supervisory role.
* Clarity in supervisor-student roles is beneficial.

**6. Educational Pathways and Student Characteristics**

**Open codes grouped under this axial code:**

* HBO student demonstrated strong initiative and practicality.
* Perceived training differences between educational tracks (university versus HBO).
* University students more detail-focused and risk-averse.
* Practical independence of HBO student.
* Greater autonomy observed in HBO student.
* Anecdotal evidence of HBO-practicality trend.
* Value of student initiative and practicality.
* University students may expect more direct guidance.

**7. Fostering Student Independence and Task Management**

**Open codes grouped under this axial code:**

* Importance of student independence in (small) tasks.
* Need for balance between support and autonomy.
* HBO student showed better problem-solving initiative.
* Lower need for detailed instruction with HBO student.
* Perception of greater confidence in HBO student.
* Supervision requires adapting to individual students.
* Need to balance workload for students.
* Avoiding both underload and overload in student work.
* Acknowledgement of need to delegate.

**8. Personal Development and Motivation in Academic Trajectory**

**Open codes grouped under this axial code:**

* Increased confidence to pursue PhD.
* Self-recognition of skill growth was motivating.

**Respondent 2**  
  
**1. Transition from Quantitative to Qualitative Research Awareness**

* Feeling of rigidity in earlier research training
* Focus on quantitative hypothesis testing
* Realization of existence of qualitative research
* Discovery and appreciation of qualitative, social research
* Recognizing the major difference between qualitative and quantitative research
* Qualitative research focuses more on inquiry
* Qualitative research is not about proving hypotheses
* Exploratory nature of qualitative research
* Different motivations behind quantitative research
* Goal of proving hypotheses in quantitative research

**2. Challenges and Justification of Qualitative Research**

* Perception that qualitative research is undervalued
* Need to justify the value of qualitative research
* Existence of rivalry between qualitative and quantitative research
* Challenge of reviewers not understanding qualitative research
* Need to explain qualitative methodology for publications
* Qualitative research requiring more explanation than quantitative
* Qualitative research being hidden in beta sciences
* Separation between qualitative and quantitative research worlds
* Lack of exposure to qualitative researchers in beta sciences

**3. Societal and Ethical Integration in Research**

* Societal implementation and ethics not a priority
* Limited integration of societal concerns in daily work
* Surprise at researchers' lack of engagement with societal issues
* Belief that societal reflection should be encouraged
* Growing integration of societal impact frameworks
* Lack of reward for societal focus
* Recognition of societal impact through awards
* Funding bodies encouraging societal impact
* Ethics and impact outsourced to specialists
* Feeling like a token ethicist
* Desire for better ethics integration
* Advocating for implementation project managers

**4. Research Training and Interdisciplinary Foundations**

* Feeling of strong research foundation from earlier degrees
* Training in setting up research and critical thinking
* Importance of chemistry knowledge for biology students
* Need for basic chemistry understanding
* Application of chemistry in neurological research
* Physics knowledge helpful for biological processes
* Physics useful for neural signal conduction
* Relevance of math for biology questioned
* Limited use of advanced math in biology
* Relevance of formulas in computational biology
* Logic/math skills useful for programming/philosophy
* Value of diverse but relevant skills
* Importance of a broad knowledge base
* Biology’s flexibility and interdisciplinarity
* Biology unique in interdisciplinary work

**5. Education Reform and Philosophical Reflection**

* Ethics superficially integrated into courses
* Ethics/philosophy deserve dedicated courses
* Ethics/societal impact not structurally integrated in methods
* Need for balance between specialization and societal reflection
* Advocacy for reflection on societal impact during education
* Critique of reductionist neuroscience approaches
* Mismatch between student motivation and research style
* Lack of space for deeper reflection in neuroscience education
* Suggestion to integrate philosophical reflection

**6. Structural and Systemic Academic Issues**

* Lack of regulatory process knowledge
* Gap between innovation and approval process
* Lack of time/incentives for regulatory work
* Researchers/doctors too busy for dossiers
* Knowledge gaps about regulation
* Stakeholder meetings perceived as useful
* Knowledge gaps unnoticed by those involved

**7. Academic Career Development and Role Differentiation**

* Surprise at late intro to teamwork skills
* Importance of structured teamwork processes
* Good researchers lacking essential skills
* Mismatch between research, teaching, and management roles
* Need for clearer role differentiation
* Differences in teaching affinity
* Critique of mandatory teaching loads
* Advocacy for task alignment with strengths
* Complaints about poor leadership
* Poor leadership harming research
* Advocacy for separate academic tracks
* Managers needing research affinity
* Critique of publication-focused promotions
* Need for holistic promotion criteria
* Allowing personal choice in career paths
* Recognition of diverse academic roles
* Criticism of inflexible structures

**8. Interpersonal Skills and Personality in Academia**

* Importance of social skills/empathy
* Academia allows flourishing without social skills
* Valuing intelligence over social skills
* Academic tolerance for varied skill sets
* Value of isolated researchers
* Personality/interest key to qualitative skills
* Building rapport through shared language
* Lab work understanding aids communication

**9. Exposure to and Advocacy for Qualitative Methods**

* Current lack of qualitative method integration
* Advocating exposure to qualitative methods
* Knowledge of qualitative research important

**10. Balancing Theory and Practice**

* Balancing theoretical frameworks and practical approaches
* Overwhelmed by number of frameworks

**Respondent 3**

**1. Interdisciplinary Integration and Communication**

**Core idea**: Navigating and reconciling disciplinary differences in knowledge, methods, and language.

* Similarity in modeling across disciplines
* Disciplinary disconnect on abstract concepts
* Disciplinary skepticism
* Disciplinary communication challenges
* Conceptual differences across disciplines
* Disciplinary mindset and epistemology
* Communication barriers across fields
* Interpretation variation in information theory
* Different starting points in disciplines
* Historical/scientific methodology contrasts
* Terminology disagreements
* Implicit academic worldviews
* Need for clarity in interdisciplinary work
* Value of cross-disciplinary dialogue
* Neuroscience as integrative field
* Positive views on academic discussion

**2. Evolving Educational Needs and Curricular Reform**

**Core idea**: Adapting education to meet modern technical, cognitive, and interdisciplinary demands.

* Traditional curricula lagging behind
* Need to integrate technical training
* Technological skill gap in education
* Modern student training requirements
* Data literacy and analysis skills
* Essential technical skills
* Importance of gradual learning
* Justifying technical education
* Necessity of foundational knowledge
* Measurement complexity and progress limits

**3. Practice-Based Learning and Skill Development**

**Core idea**: Emphasis on repetition, exposure, and practical engagement to build understanding and intuition.

* Practice-based learning in math
* Hierarchical structure of math learning
* Learning through repetition
* Intuition from repetition
* Rote practice and exposure
* Building intuition through examples
* Frequency over talent
* Demystifying math
* Challenging fixed mindset
* Effort-based learning
* Praxis over theory
* Fluency through familiarity
* Procedural vs. innate understanding

**4. Pedagogical Innovation and Personalized Learning**

**Core idea**: Use of modern teaching strategies, technologies, and individualized pathways to enhance learning.

* Personalized learning pathways
* Adaptive teaching strategies
* Flipped classroom
* Use of digital materials and platforms
* Blended learning
* Guided self-paced learning
* Self-assessment and flexible progress
* Differentiated instruction
* Multi-level instruction
* Student-centered design
* Optional deep dive
* Optional engagement with examples
* Encouragement of autonomy
* Clarity vs. engagement tension

**5. Complexity of Data and Need for Advanced Tools**

**Core idea**: Rising demands for mathematical, computational, and interpretive sophistication in modern science.

* Increasing complexity of experimental data
* Data abundance vs. interpretation
* Modern tools like machine learning
* Limitations of traditional analysis
* Temporal analysis requires math
* Growing need for technical literacy
* Necessity of technical skills for data use

**6. Student Identity, Motivation, and Mindset**

**Core idea**: Emphasizing mindset, autonomy, and willingness to learn over innate ability.

* Valuing mindset over expertise
* Self-motivated learning
* Core selection value: willingness to learn
* Embrace of heterogeneity
* Openness to interdisciplinary learning
* Identifying knowledge gaps proactively
* Trainability of technical skills
* Variation in learning pace
* Irrational fear of math
* Student responsibility

**7. Human Element in Education**

**Core idea**: Importance of teacher-student relationships, engagement, and the affective dimension of learning.

* Loss of teacher presence in digital settings
* Distance in digital education
* Monotony and predictability concerns
* Live teaching vs. video
* Importance of teacher-student connection
* Lecture as an art form
* Trade-offs between efficiency and engagement
* Guest talks and real research examples

**8. Cultural Narratives and Bias in Science**

**Core idea**: Examining myths, stereotypes, and systemic issues affecting inclusion and representation.

* Stereotype of lone genius
* Gender bias in genius narrative
* Exclusionary imagery
* Harmful archetypes in science
* Importance of collaboration
* Reframing the science narrative
* Relation between male-dominated fields and genius belief
* Issues with individual attribution

**Respondent 4**

**1. Curriculum Integration and Coherence**

* Curriculum planning; Engaging course structure
* Interdisciplinary alignment; Course integration
* Disciplinary relevance; Field-specific teaching
* Curriculum coherence; Critique of fragmented teaching
* Course alignment; Interdisciplinary references
* Cross-course evaluation; Reciprocal review
* Quality assurance; Oversight of course coherence
* Curriculum integration; Bridging to real-world science
* Curriculum gap; Prior knowledge assessment

**2. Pedagogical Approach and Instructional Design**

* Logical course structure; Pedagogical clarity
* Teaching philosophy; Approachability
* Teaching strategy; Simplifying terminology
* Thematic teaching
* Educational passion; Including real examples
* Flipped classroom efficacy; Pedagogical validation
* Flipped classroom value; Textbook limitations
* Team teaching; Expert support
* Alternative assessment; Recovery opportunities
* Teaching vulnerability; Recognition of uncertainty
* Use of recent knowledge in education
* Translational medicine; Inspirational teaching content

**3. Student Engagement and Learning Environment**

* Personal teaching involvement; Student engagement
* Creating safe learning space; Encouraging participation
* Active listening; Teaching empathy
* Socratic method; Active questioning
* Expectation oriented communication; Learning responsibility
* Student strengths; Showcasing skills through writing
* Relationship-building teacher-students
* Inclusive questioning; Encouraging participation
* Interactive teaching
* Group-based learning
* Peer review; Course evaluation system

**4. Conceptual Understanding and Critical Thinking**

* Concept linking
* Pursuit of clarity; Emphasis on understanding
* Depth over breadth; Time allocation for understanding
* Meta-knowledge; Origins of scientific content
* Scientific literacy; Literature integration
* Data analysis skill; Understanding figures
* Data literacy; Figure interpretation
* Navigating supplements; Critical reading
* Learning outcomes; Research literacy development
* Conceptual integration

**5. Practical Application and Real-world Relevance**

* Clinical application; Theory to reality approach
* Medical example; Linking immunology to symptoms
* Practical output; Real-world applicability
* Future relevance; Practical value
* Theory-practice gap
* Application gap; Context mismatch
* Theoretical overload; Practical disconnect
* Practical learning gap
* Lack of practical exposure
* Curricular limitation: lack of lab exposure
* Large-scale experimental setup; Collective sample collection
* Technique exposure; Diverse instrumentation
* Specimen preparation: experimental opportunity and real-time learning
* Rare specimen access: unique teaching moments

**6. Research Mindset and Inquiry-Based Learning**

* Curiosity cultivation; Emphasis on discovery
* Uncertainty in research; Exploratory learning
* Instilling mindset: embracing research process
* Research philosophy: acceptance of unexpected outcomes
* Lab techniques; Key methods in biology

**7. Inclusivity and Representation**

* Role modeling; Diversity promotion
* Representation importance; Gender inclusivity
* Inspirational outreach; Role model integration
* Global awareness; Preparing students for reality
* International collaboration

**8. Assessment and Feedback Mechanisms**

* Early feedback strategy; Proactive engagement
* Student feedback tools; Evaluating integration
* Course structure evaluation; Interdisciplinary coherence

**9. Foundational and Transferable Skills**

* Core skill focus; Scientific literacy
* Lifelong skill development; Lasting educational impact
* Importance of statistical tools
* Field-specific need for statistics
* Applied learning; Field-specific instruction
* Student preparation; Long-term utility

**10. Educator Identity and Teaching Values**

* Passionate instruction
* Educator preference: inspiring teaching
* Inspirational pedagogy; Logical teaching models
* Accessible science communication; Simplicity in explanation
* Support material development; Student-centered resources
* Instructional support; Use of video and mindmaps
* Flexibility and freedom in personalised educational trajectories

**Respondent 5**

**1. Ethical Awareness and Public Responsibility**

**Core Idea**: Scientists and students must develop ethical sensitivity and engage in public education and discourse.

* Belief in ethical consideration
* New ethical awareness
* Perspective shift through patient empathy
* Ethical detachment before involvement
* Call for ethical discourse
* Responsibility to educate public
* Defending integrity of researchers
* Bioethical discussion example: IVF
* Need for better bioethics communication
* Culture of discretion
* Lack of open discourse in medical settings
* Public misunderstanding of research
* Public lack of animal care education
* Mandatory research animal training
* Call for societal topics in education

**2. Diversity, Perspective, and Interdisciplinary Value**

**Core Idea**: Exposure to diverse viewpoints and disciplines enhances education, ethics, and problem-solving.

* Interdisciplinary education value
* Value of diverse perspectives
* Learning from diverse perspectives
* Realisation of differing views in classroom setting
* Recognition of ethical dilemmas across disciplines
* Advocating short societal education module
* Example of interdisciplinary internship
* Importance of interdisciplinary support
* Confidence in cross-disciplinary skill transfer
* Challenge in interdisciplinary communication
* Adaptability in learning background
* Scientific knowledge being fluid

**3. Theory–Practice Integration in Higher Education**

**Core Idea**: Bridging the gap between theoretical learning and practical skills through applied, hands-on education.

* Disconnect between education and practice
* Netherlands' theoretical focus
* Academic system's theory orientation
* More hands-on knowledge in other countries
* University education should be practical too
* Critique of theory-only education
* Applied learning approach
* Integrated practical learning
* Balanced theoretical and practical strength
* Balanced theoretical training
* Practical experience builds reassurance
* Relevance of foundational techniques
* Transferable practical skills

**4. Technical Skill Development and Foundational Training**

**Core Idea**: Emphasis on early, broad-based technical training to support confidence, independence, and competence.

* Need for foundational technical training
* Need for basic lab technique training
* Lack of basic lab experience among students
* Versatility of basic techniques
* Importance of universal technical competence
* Prerequisite competence for advanced work
* Importance of chemical safety awareness
* Confidence gained through practice
* Experience builds reassurance
* Confidence in research
* Importance of topic diversity
* Transferability of skills

**5. Critical Thinking and Statistical Literacy**

**Core Idea**: Fostering analytical thinking and statistical competence as essential parts of scientific training.

* Critical thinking gap in education
* Importance of critical thinking
* Assessing reliability of scientific information
* Learning through repetition
* Practice required for critical evaluation
* Neglect of statistical application
* Theory–practice gap in statistics
* Contextual learning of statistics
* Learning statistics through practice
* Need for applied statistical training
* Need for statistical competence
* Lack of statistical expertise in teams

**6. Practical Limitations and Structural Barriers**

**Core Idea**: Time, funding, and systemic constraints hinder effective integration of theory and practice.

* Time and space constraints
* Need for financial investment
* High individual workload
* Lack of technical assistance
* Challenges integrating theory and practice
* Lack of leadership training
* Leadership gaps lead to problems
* Consequences of poor management
* Teaching role mismatch
* Teaching and research are different skills
* Lack of life skill training

**7. Independent Learning and Personal Development**

**Core Idea**: Education as a journey of self-discovery, developing autonomy, preferences, and adaptability.

* Self-discovery through exposure
* Understanding preferences
* Clarifying interests through dislikes
* Personal development through education
* Self-teaching as a trait of a good scientist
* Supervisor-supported autonomy
* Fostering responsibility and independence
* Learning through practice
* Practice over theory in math
* Understanding follows repetition
* Short-term technical repetition

**8. Practical Training and Internship Shortcomings**

**Core Idea**: Current reliance on internships for technical learning is inadequate and highlights systemic weaknesses.

* Overreliance on internships for practical training
* Limited technical exposure during internships
* Problem with narrowly focused internships
* Critique of outsourcing practical education
* Uncertainty about applicability of learned skills
* Technique knowledge over domain expertise