**1. What is at the core of good biological education?**  
Theme A: Educational Philosophy and Pedagogy: Education Reform and Modernization  
*Core Insight:* Effective education requires coherent curriculum design, engaged pedagogy, and inclusive teaching values.

*Relevant Axial Codes:*

* 4.2: Pedagogical Approach and Instructional Design
* 3.2: Evolving Educational Needs and Curricular Reform
* 2.5: Education Reform and Philosophical Reflection
* 5.6: Practical Limitations and Structural Barriers

*Description:*  
Traditional curricula are perceived as outdated, overly rigid, or overly theoretical. There is advocacy for reform through flipped classrooms, real-world integration, adaptive learning, and ethical/philosophical reflection, albeit constrained by systemic issues like time, funding, and leadership.

Theme B: Theory–Practice Integration and Real-World Relevance  
*Core insight:* Strong programs balance theoretical frameworks with hands-on, applied learning, lab experience, and real-world relevance, ensuring students can transfer abstract knowledge into meaningful practice.

*Relevant Axial Codes*

* 1.2: Theory vs. Practice in Science
* 4.5: Practical Application and Real-world Relevance
* 5.3: Theory–Practice Integration in Higher Education
* 3.3: Practice-Based Learning and Skill Development
* 5.4: Technical Skill Development and Foundational Training

*Description:*

Aligning scientific theory with real-world relevance is essential to meaningful biology education. Participants emphasize the frequent disconnect between abstract models and ecological or biological complexity, noting that real-life ecosystems often defy oversimplification. Effective teaching bridges this gap through practice-based learning, repeated exposure, and applied contexts such as lab work or field research. A hands-on approach fosters intuition and confidence, allowing students to grasp foundational techniques and build transferable skills. Balanced curricula that values both theory and application is necessary to prepare students for the multifaceted demands of modern biology.

**2. How can a sustainable and close connection between biological education and biological research be established?**  
Theme C: Structural Support for Practical Training

*Core insight:* Sustainable connection requires system-level reform: adequate time, funding, and leadership for technical training, internships, and lab exposure to ensure students are not underprepared for research roles.

*Relevant Axial Codes:*

* 1.2: Theory vs. Practice in Science
* 5.3: Theory–Practice Integration in Higher Education
* 4.5: Practical Application and Real-world Relevance
* 2.10: Balancing Theory and Practice
* 5.4: Technical Skill Development and Foundational Training
* 3.3: Practice-Based Learning and Skill Development
* 1.7: Fostering Student Independence and Task Management
* 5.8: Practical Training and Internship Shortcomings

*Description:*

Participants express concern over the disconnect between theoretical instruction and practical application. While theory provides foundational structure, there's strong advocacy for more hands-on, applied, and contextually grounded learning experiences to truly grasp complexity. There is a widespread call for improved early and repeated technical training. Reliance on internships or ad hoc learning is seen as insufficient. Repetition, exposure, and guided autonomy are viewed as key to building competence and confidence.

Theme D: Societal Dimensions in Science  
*Core insight:* Science is a praxis that takes place in the context of society and interacts with societal values, ethics, communication, and public understanding. Students need to be appropriately prepared for this role.

*Relevant Axial Codes:*

* 2.7: Academic Career Development and Role Differentiation
* 5.6: Practical Limitations and Structural Barriers
* 4.10: Educator Identity and Teaching Values
* 3.8: Cultural Narratives and Bias in Science
* 4.7: Inclusivity and Representation
* 2.8: Interpersonal Skills and Personality in Academia
* 5.2: Diversity, Perspective, and Interdisciplinary Value
* 2.1, 2.2, 2.3: Transition to Qualitative Research & Challenges of Qualitative Research
* 2.5: Education Reform and Philosophical Reflection
* 5.1: Ethical Awareness and Public Responsibility
* 5.2: Diversity, Perspective, and Interdisciplinary Value

*Description:*

* Recognition of Diverse Roles and Career Paths: A sustainable system acknowledges that education, research, leadership, and communication are distinct but interlinked roles, and allows flexible academic paths that reflect individual strengths. (Codes: 2.7, 5.6, 4.10)
* Inclusive and humanized scientific culture: To sustain long-term connection, the culture of science and education must be inclusive, empathetic, and collaborative—valuing diversity, rejecting elitist myths, and celebrating shared inquiry. (*Codes: 3.8, 4.7, 2.8, 5.2)*
* Public communication and understanding: pointing to misinterpretations of scientific conclusions, the role of narrative in scientific communication, and broader societal misunderstandings of science—important to bridging science and society.
* Qualitive research: strengthening ties between education, research and society also means legitimizing qualitative and ethical approaches, societal impact frameworks, and broader reflection within both domains. *(Codes: 2.1–2.3, 2.5, 5.1, 5.2)*

**3. To what extent does a biologist need to know / learn about other disciplines?**

Theme E: Interdisciplinarity as Strength and Challenge  
*Core Insight:* Scientific and educational work benefits from a blend of disciplines, foundational skills, and broad knowledge bases.

*Relevant Axial Codes:*

* 1.1: Interdisciplinary Foundations and Scientific Training
* 2.4: Research Training and Interdisciplinary Foundations
* 5.2: Diversity, Perspective, and Interdisciplinary Value
* 3.1: Interdisciplinary Integration and Communication
* 4.1: Curriculum Integration and Coherence
* 3.2: Evolving Educational Needs and Curricular Reform

*Description:*

* Biological education thrives on broad, interdisciplinary grounding—integrating chemistry, physics, statistics, and philosophy—with emphasis on depth of conceptual understanding rather than memorization or reductionist views.
* Interdisciplinarity is widely valued for fostering broad understanding, flexible thinking, and collaboration. However, it brings challenges in communication, epistemology, and coherence of training. There’s a recurring recognition that disciplinary silos hinder integration and real-world application.