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June 5th & 6th **2025**
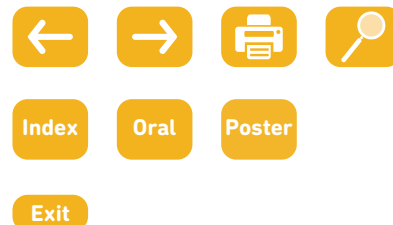
**ORAL & POSTER COMMUNICATIONS**

## POSTER COMMUNICATIONS

### ID 69
### RELATIONSHIP BETWEEN LEARNING OUTCOMES, COMPETENCIES AND FORMATIVE AND SUMMATIVE ASSESSMENT OF STUDENT LEARNING IN FARM ANIMALS BIOSECURITY COURSES

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### Introduction

Constructive alignment (CA) that includes learning outcomes (LOs), competencies (COs), formative assessment (FA) and summative assessment (SA) of student learning is very important for the successful teaching by educators and the acquisition of student competencies.

### Objectives

The paper aims to analyze relationships between LOs, COs, FA and SA of student learning in farm animals biosecurity (FAB) courses and their CA.

### Material and Methods

The authors' focus group analyzed 51 papers to identify issues related to the definition of LOs, COs, FA and SA related to FAB courses, and tables were created, illustrating relationships between LOs, COs, FA and SA for FAB courses.

### Results

The FAB courses should equip students with the knowledge, skills, and attitudes to implement biosecurity in various farm settings. Three core competency groups are identified: generic (instrumental, interpersonal, systemic), 21st-century skills, and program-specific competencies. Students must develop a strong foundation in biosecurity principles, including risk analysis, disease transmission, and prevention. This enables them to conduct risk assessments and implement biosecurity measures effectively. Decision-making at strategic, tactical, and operational levels is essential for addressing evolving challenges. Biosecurity expertise also requires sociocultural awareness, communication, and problem-solving skills. Assessment should combine formative and summative approaches. Formative assessment provides feedback, while summative assessment evaluates final competency achievement. Traditional exams test theoretical knowledge, while practical assessments—such as risk analysis, case studies, and simulations—measure students' ability to apply knowledge in real-world situations.

### Conclusions

The LOs define expected knowledge, skills, and attitudes, while COs ensure students develop expertise in biosecurity applications. Assessment methods verify the achievement of these COs. A competency-based approach should blend foundational knowledge with experiential learning and rigorous assessment methods, ensuring students are well-prepared for theoretical and practical biosecurity challenges, including policy implementation, risk assessment, fieldwork, emergency response, and stakeholder communication.

### Financial support and Acknowledgements

### Keywords

farm animal biosecurity • learning outcomes • competencies • assessment
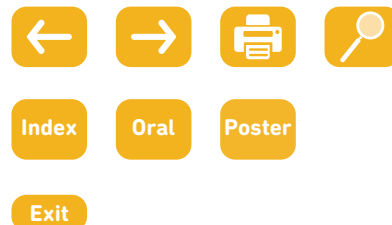
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| Table 1. Structural Framework for Aligning Learning Outcomes and Competencies | |
|---|---|
| **Component** | **Definition in Farm Biosecurity Context** |
| Learning Outcomes | What students should know, understand, and be able to do upon course completion. |
| Competencies | The combination of knowledge, skills, values and attitudes that students develop to perform biosecurity-related tasks effectively |
| Assessment Methods | Tools and techniques used to evaluate whether students have achieved the intended learning outcomes and acquired the necessary competencies |

| Table 2. Learning Outcomes and Their Direct Connection to Competencies and Assessment | | |
|---|---|---|
| **Learning Outcomes** | **Related Competencies** | **Assessment Methods** |
| 1. Understanding the principles and importance of farm biosecurity | Instrumental: Knowledge of epidemiology, pathogen transmission, and risk factors<br>Systemic: Ability to integrate biosecurity measures into sustainable farm management | Written exams (Multiple Choice Questions (MCQs), case studies)<br>Oral presentations on biosecurity principles |
| 2. Identifying and assessing farm biosecurity risks | Instrumental: Risk assessment skills, problem-solving<br>Professional: Application of risk analysis frameworks<br>21st-Century Competencies: Digital biosecurity risk analysis tools | Practical risk assessment report on a farm<br>AI-based risk assessment simulation |
| 3. Implementing biosecurity protocols in farm settings | Professional: Proper use of Personal Protective Equipment (PPE), disinfection methods, animal movement control<br>Interpersonal: Communication with farm staff<br>Systemic: Decision-making in emergency situations | Practical skills test on biosecurity implementation<br>Farm biosecurity audit report |
| 4. Applying One Health principles in farm biosecurity | Systemic: Understanding zoonotic risks, antimicrobial resistance<br>21st-Century Competencies: Use of data-driven disease prevention strategies<br>Interpersonal: Collaboration with public health and veterinary authorities | Group discussions on One Health case studies<br>Reflective essay on the global impact of farm biosecurity |
| 5. Using digital tools for farm biosecurity monitoring | 21st-Century Competencies: AI, IoT, blockchain applications in biosecurity<br>Professional: Technology-assisted surveillance and data interpretation | Digital farm biosecurity monitoring project<br>Interactive simulations of disease outbreak scenarios |
| 6. Educating farm workers on biosecurity measures | Interpersonal: Communication, leadership, training skills<br>Professional: Ability to translate technical knowledge into practical instructions<br>Systemic: Ethical responsibility for disease prevention | Recorded training session or workshop for farm workers<br>Peer-reviewed biosecurity education campaign |
| 7. Develop and implement farm biosecurity improvement plans | Professional: Ability to design evidence-based biosecurity programs<br>Systemic: Long-term strategic thinking<br>Instrumental: Policy and regulatory knowledge | Farm biosecurity plan project with policy recommendations<br>Presentation to stakeholders on improving farm biosecurity |
| 8. Respond to biosecurity breaches and disease outbreaks effectively | Professional: Crisis management skills, emergency response<br>Systemic: Adaptability in changing disease scenarios<br>21st-Century Competencies: Data-driven outbreak management | Role-playing emergency outbreak response<br>Case study analysis of a real-world biosecurity failure |

| Table 3. Assessment Model for Competency Acquisition | | |
|---|---|---|
| **Assessment Type** | **Purpose** | **Competency Evaluated** |
| Written Exams | Test theoretical knowledge of biosecurity principles | Instrumental (Cognitive Skills) |
| Farm Biosecurity Audit Report | Evaluate practical risk assessment and management skills | Professional and Systemic |
| Practical Lab Test | Assess biosecurity measures application (PPE, disinfection) | Professional |
| Digital Biosecurity Project | Apply AI and IoT tools for monitoring farm biosecurity | 21st-Century Competencies |
| Training Session Presentation | Assess ability to educate others on biosecurity | Interpersonal |
| Policy Proposal for Biosecurity Improvement | Evaluate long-term planning and systemic thinking | Systemic and Professional |
| Outbreak Response Role-Play | Assess crisis management and adaptability | Professional and Systemic |