

SEPI-SIM Implementation Package

Supplementary Educational Resources for the Implementation of the Simulation-based Educational Platform for Integrated Assessment and Monitoring (SEPI-SIM)

Introduction

This implementation package accompanies the conceptual article "SEPI-SIM: An Educational Architecture for Longitudinal Competency Development in Simulation-Based Health Professions Education."

SEPI-SIM was developed as a theory-informed educational architecture that integrates competency-based education, simulation-based learning, programmatic assessment, structured feedback, and learning analytics into a coherent framework for longitudinal competency development. While the main manuscript describes the theoretical foundations, educational rationale, and conceptual architecture of the framework, the present implementation package provides practical resources intended to facilitate its interpretation, adaptation, and future implementation.

The materials contained in this package are not standardized instruments nor validated assessment tools. Instead, they are illustrative implementation resources designed to demonstrate how the conceptual principles described in the manuscript may be operationalized within undergraduate health professions education. Consequently, educators are encouraged to adapt these resources according to local curricula, competency frameworks, institutional policies, available educational technologies, simulation infrastructure, and learner characteristics.

The implementation package has four primary objectives:

1. To facilitate translation of the SEPI-SIM conceptual framework into educational practice.
2. To provide examples of educational resources aligned with the proposed assessment architecture.
3. To promote consistency in future implementation and validation studies.
4. To encourage adaptation and continuous refinement of the framework across different health professions education programs.

Rather than prescribing a single implementation strategy, the package illustrates one possible operationalization of SEPI-SIM while maintaining flexibility for local educational needs. The resources emphasize longitudinal competency development, constructive alignment, formative assessment, structured feedback, and continuous educational improvement.

Contents of the Implementation Package

This supplementary package contains the following documents:

Additional File 1. SEPI-SIM Implementation Guide

Provides practical guidance for implementing the four educational phases of SEPI-SIM, including recommended implementation steps, faculty responsibilities, learner progression, and suggested workflow for competency monitoring.

Additional File 2. Assessment Resources

Presents example assessment instruments illustrating how competency development may be documented throughout the framework, including diagnostic assessments, competency rubrics, procedural checklists, reflection guides, feedback matrices, competency portfolios, and dashboard concepts.

Additional File 3. Competency Mapping Templates

Provides adaptable templates that align curriculum learning outcomes, competency domains, simulation activities, assessment resources, feedback processes, and longitudinal competency monitoring.

Additional File 4. Learning Analytics Framework

Describes the conceptual organization of educational information generated throughout SEPI-SIM, including recommended educational indicators, competency trajectories, dashboard organization, and examples of longitudinal monitoring for educational decision-making.

Additional File 5. Institutional Implementation Checklist

Offers a structured checklist that institutions may use when planning local implementation of SEPI-SIM, including curriculum alignment, faculty preparation, assessment resources, data management, quality assurance, and continuous evaluation.

Intended Use

These supplementary materials are intended for educators, curriculum designers, simulation centers, academic leaders, and researchers interested in implementing or evaluating competency-based assessment within simulation-based health professions education.

Because SEPI-SIM represents a conceptual educational architecture rather than a validated educational intervention, the resources presented here should be considered implementation examples rather than prescriptive protocols. Future empirical studies are expected to refine these materials through psychometric validation, educational evaluation, multicenter implementation, and continuous improvement.

The authors encourage adaptation, contextualization, and scholarly evaluation of these materials in accordance with local educational needs and institutional priorities.

Citation

When using or adapting these supplementary materials, please cite the accompanying SEPI-SIM manuscript together with the archived implementation package available through the associated Zenodo repository.

Additional File 1
SEPI-SIM Implementation Guide
Supplementary material

SEPI-SIM Implementation Guide

This implementation guide provides practical recommendations for educational institutions interested in adopting the Simulation-based Educational Platform for Integrated Assessment and Monitoring (SEPI-SIM). The guide summarizes the sequential implementation process described in the conceptual framework and illustrates how its educational components may be integrated into existing competency-based simulation programs.

SEPI-SIM is intended as a flexible educational architecture rather than a prescriptive protocol. Consequently, implementation should be adapted according to institutional resources, curricular structure, simulation capacity, and local educational priorities.

Overview of the SEPI-SIM implementation process

Implementation of SEPI-SIM follows four sequential phases that together create a continuous cycle of competency development and educational improvement.

<i>Phase</i>	<i>Primary objective</i>	<i>Main educational output</i>
<i>Phase 1. Diagnostic Assessment</i>	Identify baseline learner characteristics and educational needs	Baseline competency profile
<i>Phase 2. Progressive Competency Assessment</i>	Assess learner performance through progressively complex simulation activities	Structured assessment evidence
<i>Phase 3. Structured Feedback</i>	Transform assessment findings into individualized learning through guided reflection	Personalized learning plan
<i>Phase 4. Longitudinal Competency Monitoring</i>	Integrate assessment information across multiple learning experiences	Longitudinal competency profile

Phase 1. Diagnostic Assessment

Before simulation activities begin, learners complete baseline educational assessments designed to identify:

- prior knowledge
- baseline clinical reasoning
- self-perceived competence
- previous simulation experience
- individual learning needs

The objective is not learner selection but educational planning. Information obtained during this phase allows educators to determine appropriate simulation complexity and establish individualized learning objectives.

Suggested educational resources

- Diagnostic knowledge test
- Self-assessment questionnaire
- Baseline competency survey

Phase 2. Progressive Competency Assessment

Simulation activities should be organized using progressively increasing levels of complexity that correspond to expected competency development throughout the curriculum.

During each simulation session, learner performance is documented using standardized assessment instruments.

Examples include:

- competency rubrics
- procedural checklists
- communication assessment tools
- teamwork evaluation instruments
- professionalism rating scales

Repeated low-stakes assessments generate cumulative information that documents learner progression over time.

Phase 3. Structured Feedback

Immediately following each simulation activity, educators conduct structured debriefing using standardized feedback approaches.

Feedback should include:

- strengths demonstrated
- areas requiring improvement
- learner self-reflection
- individualized learning goals
- recommendations for future simulation activities

Documentation of feedback enables continuity across successive learning experiences rather than treating each simulation session as an isolated educational event.

Phase 4. Longitudinal Competency Monitoring

Assessment information generated throughout the curriculum is integrated into longitudinal learner profiles.

Rather than emphasizing individual examination scores, educators review cumulative competency trajectories across multiple simulation experiences.

Longitudinal monitoring may support:

- identification of learners requiring additional academic support
- monitoring of competency progression
- curriculum evaluation
- educational quality improvement
- evidence-informed educational decision-making

Educational Components

Successful implementation of SEPI-SIM requires the coordinated use of several complementary educational resources.

<i>Educational component</i>	<i>Primary function</i>
<i>Diagnostic assessments</i>	Baseline educational profiling
<i>Competency rubrics</i>	Integrated competency assessment
<i>Procedural checklists</i>	Technical skill assessment
<i>Structured debriefing guides</i>	Reflective learning
<i>Feedback matrices</i>	Individualized feedback
<i>Competency portfolios</i>	Longitudinal documentation
<i>Learning analytics dashboards</i>	Educational monitoring

Institutions may adopt equivalent educational resources that fulfill similar educational functions.

Institutional Adaptation

SEPI-SIM was intentionally designed as a transferable educational architecture.

Implementation may therefore be adapted according to:

- undergraduate or postgraduate curricula
- medicine, nursing, dentistry, physiotherapy, medical technology, or other health professions
- simulation centers
- skills laboratories
- Objective Structured Clinical Examinations (OSCEs)

- workplace-based simulation
- interprofessional education programs

Local adaptation should preserve the fundamental principles of progressive assessment, structured feedback, longitudinal competency monitoring, and constructive alignment.

Suggested Implementation Workflow

- 1) Define competency outcomes.
- 2) Design simulation activities aligned with competencies.
- 3) Select standardized assessment instruments.
- 4) Conduct simulation sessions.
- 5) Perform structured debriefing.
- 6) Document assessment information.
- 7) Update longitudinal competency profiles.
- 8) Review learner progression.
- 9) Use accumulated information to support educational and curriculum decisions.
- 10) Repeat the cycle throughout the curriculum.

Key Principles for Implementation

Successful implementation of SEPI-SIM depends on maintaining several core educational principles:

- Competency-based educational planning
- Constructive alignment between learning outcomes, simulation, assessment, and feedback
- Multiple low-stakes assessments instead of isolated high-stakes examinations
- Structured reflective feedback after each simulation activity
- Longitudinal integration of assessment information
- Continuous competency monitoring
- Evidence-informed educational decision-making

These principles may be implemented using different educational resources while preserving the conceptual integrity of the SEPI-SIM framework.

Additional File 2

Assessment Resources Integrated Within SEPI-SIM

This supplementary file describes the principal educational assessment resources incorporated within the Simulation-based Educational Platform for Integrated Assessment and Monitoring (SEPI-SIM). Rather than presenting validated instruments, these resources represent the conceptual assessment components that operationalize the educational architecture described in the main manuscript. They illustrate how assessment information is generated, documented, integrated, and used throughout the longitudinal competency development process.

Educational Assessment Resources

1. Contextualized Diagnostic Assessment

Educational purpose

To establish each learner's baseline competency profile before participation in simulation-based learning activities.

Primary functions

- Identify prior knowledge.
- Explore baseline clinical reasoning.
- Assess self-perceived competence.
- Detect individual learning needs.
- Support individualized learning objectives.

Timing: Administered once before the first simulation session.

Information generated

- Baseline competency profile
- Initial learning needs
- Starting point for longitudinal monitoring

2. Progressive Competency Rubric

Educational purpose

To evaluate integrated competency development during progressively complex simulation activities.

Competency domains

Examples include:

- Clinical reasoning
- Technical skills

- Communication
- Teamwork
- Professionalism
- Patient safety
- Clinical decision-making

Timing: Completed after every simulation activity.

Information generated

- Competency level achieved
- Progress across simulation sessions
- Areas requiring improvement

3. Procedural Performance Checklist

Educational purpose

To document completion of critical procedural actions during simulation.

Typical applications

- Technical procedures
- Clinical algorithms
- Safety protocols
- Equipment use
- Emergency management

Timing: Completed during simulation.

Information generated

- Procedural accuracy
- Critical omissions
- Technical performance

4. Structured Debriefing Guide

Educational purpose

To facilitate reflective learning immediately following simulation activities.

Core components

- Description of performance
- Analysis of clinical reasoning
- Reflection on strengths
- Identification of improvement opportunities
- Planning of future learning goals

Timing: Immediately after each simulation.

Information generated

- Reflective learning records
- Feedback priorities
- Individual improvement plans

5. Feedback Matrix

Educational purpose

To organize formative feedback into standardized educational categories.

Information sources

- Faculty feedback
- Peer feedback
- Self-assessment

Suggested domains

- What was performed effectively
- What requires improvement
- Recommended actions
- Follow-up objectives

Information generated

- Structured formative feedback
- Individualized learning recommendations

6. Longitudinal Competency Portfolio

Educational purpose

To accumulate assessment information across multiple educational experiences.

Contents

Examples include

- Diagnostic assessment results
- Competency rubrics
- Procedural checklists
- Reflection records
- Feedback summaries
- Learning goals
- Progress documentation

Educational function

Provides a comprehensive record of competency development over time.

7. Learning Analytics Dashboard

Educational purpose

To integrate assessment information into longitudinal competency monitoring.

Potential indicators

- Competency progression
- Assessment completion
- Performance trends
- Achievement of learning outcomes
- Areas requiring additional support

Educational function

Supports longitudinal monitoring at the learner, course, and program levels.

Integration of Assessment Resources Within SEPI-SIM

Each educational resource fulfills a specific function within the assessment process while simultaneously contributing information to the overall educational architecture. Rather than operating independently, the resources are sequentially integrated throughout the four phases of SEPI-SIM:

<i>SEPI-SIM phase</i>	<i>Primary assessment resource</i>	<i>Principal output</i>
<i>Phase 1. Diagnostic Assessment</i>	Contextualized Diagnostic Assessment	Baseline competency profile
<i>Phase 2. Progressive Competency Assessment</i>	Competency Rubrics and Procedural Checklists	Structured assessment information
<i>Phase 3. Structured Feedback</i>	Debriefing Guide and Feedback Matrix	Reflective learning and individualized feedback
<i>Phase 4. Longitudinal Competency Monitoring</i>	Competency Portfolio and Learning Analytics Dashboard	Longitudinal competency profiles

Educational Role of the Assessment Resources

Collectively, these assessment resources operationalize the SEPI-SIM framework by supporting:

- continuous competency assessment;
- progressive learner development;
- standardized documentation of performance;
- structured formative feedback;
- longitudinal competency monitoring;
- evidence-informed educational decision-making.

Although the educational functions of these resources are described conceptually in this supplementary material, individual institutions may adapt their specific format, content, and implementation according to local curricular needs while maintaining the underlying educational principles of SEPI-SIM.

Additional File 3

Competency Mapping Templates

Supporting templates for curriculum alignment and longitudinal competency monitoring within the SEPI-SIM educational architecture

This supplementary material provides practical templates to support competency mapping during the implementation of SEPI-SIM.

The templates are intended to assist educators in aligning learning outcomes, simulation activities, assessment methods, feedback processes, and longitudinal competency monitoring within competency-based health professions education.

The examples presented are generic and should be adapted according to institutional curricula, professional disciplines, educational levels, and local competency frameworks.

Template 1

Curriculum-to-Competency Mapping Matrix

<i>Curriculum Learning Outcome</i>	<i>Competency Domain</i>	<i>Expected Performance Level</i>	<i>Suggested Simulation Activity</i>	<i>Assessment Instrument</i>	<i>Feedback Strategy</i>
<i>CLO 1</i>	Clinical reasoning	Beginner	Case-based simulation	Competency rubric	Guided debriefing
<i>CLO 2</i>	Technical skills	Intermediate	Procedural simulation	Checklist rubric	+ Instructor feedback
<i>CLO 3</i>	Communication	Intermediate	Standardized patient	Rubric	Peer feedback
<i>CLO 4</i>	Teamwork	Intermediate	Team simulation	Teamwork rubric	Structured reflection
<i>CLO 5</i>	Professionalism	Advanced	Complex clinical scenario	Global assessment rubric	Reflective discussion

Suggested use

This matrix should be completed during curriculum planning to ensure alignment between intended learning outcomes and competency assessment.

Template 2

Competency Progression Matrix

<i>Competency Domain</i>	<i>Novice</i>	<i>Developing</i>	<i>Competent</i>	<i>Advanced</i>
<i>Clinical reasoning</i>	Recognizes clinical information	Applies structured reasoning	Integrates clinical evidence	Manages complex uncertainty
<i>Technical skills</i>	Performs basic procedures	Performs procedures with guidance	Performs independently	Performs efficiently in complex situations
<i>Communication</i>	Basic communication	Communicates effectively with patients	Adapts communication to context	Leads difficult conversations
<i>Teamwork</i>	Participates within team	Collaborates effectively	Coordinates team activities	Leads multidisciplinary teams
<i>Professionalism</i>	Demonstrates ethical awareness	Consistently professional	Promotes professional practice	Serves as professional role model

Suggested use

Performance levels should be adapted to institutional competency frameworks and progression expectations.

Template 3

Simulation Planning Template

<i>Component</i>	<i>Description</i>
<i>Simulation title</i>	
<i>Target competency domains</i>	
<i>Learning outcomes</i>	
<i>Simulation modality</i>	
<i>Complexity level</i>	
<i>Required equipment</i>	
<i>Faculty members</i>	
<i>Estimated duration</i>	
<i>Assessment instruments</i>	
<i>Debriefing model</i>	
<i>Expected competency level</i>	

Suggested use

This template supports constructive alignment before simulation implementation.

Template 4

Assessment Blueprint

<i>Competency Domain</i>	<i>Simulation Activity</i>	<i>Assessment Tool</i>	<i>Assessor</i>	<i>Weight</i>
<i>Clinical reasoning</i>	Scenario 1	Competency rubric	Faculty	30%
<i>Technical skills</i>	Scenario 1	Checklist	Faculty	25%
<i>Communication</i>	Scenario 2	Rubric	Faculty + SP	20%
<i>Teamwork</i>	Scenario 2	Team assessment rubric	Faculty	15%
<i>Professionalism</i>	All activities	Global rating	Faculty	10%

Suggested use

Blueprinting facilitates balanced competency assessment across multiple simulation activities.

Template 5

Longitudinal Competency Tracking Matrix

<i>Simulation Session</i>	<i>Clinical Reasoning</i>	<i>Technical Skills</i>	<i>Communication</i>	<i>Teamwork</i>	<i>Professionalism</i>	<i>Faculty Comments</i>
<i>Baseline</i>						
<i>Session 1</i>						
<i>Session 2</i>						
<i>Session 3</i>						
<i>Session 4</i>						
<i>Final</i>						

Suggested use

Repeated observations allow educators to identify competency trajectories rather than relying on isolated assessment results.

Template 6

Individual Learning Plan

Student

Program

Date

Strengths identified

Competencies requiring further development

Learning objectives

1. _____
2. _____
3. _____

Planned learning activities

Follow-up simulation sessions

Faculty observations

Template 7
Curriculum Monitoring Dashboard (Example Structure)

<i>Indicator</i>	<i>Example Metric</i>
<i>Students achieving competency</i>	%
<i>Average competency progression</i>	Score
<i>Students requiring remediation</i>	n (%)
<i>Competency domains with lowest performance</i>	Ranking
<i>Number of simulation sessions completed</i>	n
<i>Faculty feedback completion</i>	%
<i>Reflection completion</i>	%
<i>Portfolio completion</i>	%

Suggested use

Institutions may adapt these indicators according to their educational information systems and quality assurance requirements.

Guidance for Adaptation

The templates presented in this supplementary file are intended as flexible implementation resources rather than standardized assessment instruments.

Educators are encouraged to adapt competency domains, learning outcomes, performance descriptors, assessment criteria, and documentation formats according to local curricular requirements, institutional policies, available simulation resources, and national competency frameworks.

When implemented together with the assessment resources presented in Additional File 2, these templates support constructive alignment across curriculum planning, simulation delivery, competency assessment, structured feedback, and longitudinal learner monitoring, thereby operationalizing the educational architecture proposed by SEPI-SIM.

Additional File 4

Learning Analytics Framework for Longitudinal Competency Monitoring within SEPI-SIM

This supplementary document describes the learning analytics framework that supports longitudinal competency monitoring within the Simulation-based Educational Platform for Integrated Assessment and Monitoring (SEPI-SIM).

The framework illustrates how assessment information generated throughout successive simulation-based learning experiences can be systematically organized to support learner progression, educational feedback, curriculum management, and evidence-informed educational decision-making.

This document provides an example of the conceptual organization of educational information and is intended as a practical implementation resource. It does not prescribe specific software platforms or institutional information systems.

1. Learning Analytics within SEPI-SIM

Within SEPI-SIM, learning analytics is not conceived as a technological solution but as an educational process through which assessment information generated across multiple simulation activities is transformed into meaningful information for educators and learners.

Rather than interpreting individual assessment events in isolation, SEPI-SIM emphasizes the longitudinal integration of multiple sources of assessment information collected throughout competency development.

The learning analytics framework therefore supports:

- longitudinal monitoring of competency development;
- visualization of learner progression;
- identification of learning needs;

- individualized educational feedback;
- curriculum evaluation;
- evidence-informed educational decision-making.

2. Sources of Assessment Information

Assessment information incorporated into the learning analytics framework may originate from multiple educational components throughout the simulation curriculum.

Typical sources include:

<i>Educational component</i>	<i>Information generated</i>
<i>Diagnostic assessment</i>	Baseline competency profile
<i>Competency rubrics</i>	Competency scores across domains
<i>Procedural checklists</i>	Technical performance indicators
<i>Reflection guides</i>	Learner self-reflection
<i>Structured debriefing</i>	Feedback records
<i>Faculty observations</i>	Narrative comments
<i>Peer assessment</i>	Collaborative performance observations
<i>Portfolio activities</i>	Longitudinal evidence of competency development

The integration of these complementary sources provides a richer representation of learner progression than isolated examination scores.

3. Competency Monitoring Structure

SEPI-SIM organizes assessment information according to predefined competency domains.

An example competency structure is presented below.

<i>Competency domain</i>	<i>Example indicators</i>
<i>Clinical reasoning</i>	Diagnostic reasoning, prioritization, decision-making
<i>Technical skills</i>	Procedural accuracy, efficiency, safety
<i>Communication</i>	Patient communication, team communication
<i>Teamwork</i>	Collaboration, leadership, coordination
<i>Professionalism</i>	Responsibility, ethics, accountability
<i>Patient safety</i>	Risk identification, safe clinical practice

Institutions may modify competency domains according to local competency frameworks while maintaining the overall structure of longitudinal monitoring.

4. Longitudinal Data Collection

Assessment information is collected repeatedly throughout successive simulation activities.

An illustrative monitoring sequence is shown below.

<i>Simulation session</i>	<i>Assessment collected</i>
<i>Baseline</i>	Diagnostic assessment
<i>Simulation 1</i>	Rubric + Checklist + Debriefing
<i>Simulation 2</i>	Rubric + Checklist + Reflection
<i>Simulation 3</i>	Rubric + Checklist + Feedback
<i>Simulation 4</i>	Rubric + Checklist + Portfolio
<i>End of course</i>	Longitudinal competency review

Repeated low-stakes assessments provide progressively richer information regarding learner development.

5. Competency Dashboard Example

Institutions may summarize longitudinal assessment information using competency dashboards.

An illustrative dashboard structure is presented below.

<i>Competency</i>	<i>Current level</i>	<i>Trend</i>	<i>Educational action</i>
<i>Clinical reasoning</i>	Developing	↑	Continue progression
<i>Technical skills</i>	Competent	→	Maintain practice
<i>Communication</i>	Developing	↑	Additional feedback
<i>Teamwork</i>	Competent	↑	Reinforce strengths
<i>Professionalism</i>	Competent	→	Routine monitoring
<i>Patient safety</i>	Developing	↓	Targeted remediation

Dashboard formats may vary according to institutional needs.

6. Educational Interpretation

Learning analytics within SEPI-SIM emphasizes educational interpretation rather than numerical scoring alone.

Assessment information may be used to identify:

- competency progression;
- stable competency achievement;
- delayed progression;
- persistent learning gaps;
- inconsistent performance;
- learners requiring additional educational support.

Interpretation should always consider multiple assessment observations collected across time rather than isolated assessment events.

7. Educational Decision-Making

Longitudinal assessment information may support educational decisions at different organizational levels.

Learner level

- individualized feedback;
- personalized learning objectives;
- remediation planning;
- competency progression monitoring.

Faculty level

- adaptation of simulation complexity;
- targeted coaching;
- identification of common learning needs;
- documentation of learner progress.

Course level

- evaluation of course learning outcomes;
- refinement of simulation scenarios;
- assessment quality improvement.

Program level

- curriculum monitoring;
- competency mapping;
- accreditation evidence;
- quality assurance.

8. Suggested Visualization Strategies

Learning analytics information may be represented using different visualization approaches according to institutional resources.

Possible visualization strategies include:

- longitudinal line graphs;
- radar charts;
- heat maps;
- competency progression matrices;
- learner dashboards;
- cohort comparison reports.

The selection of visualization methods should prioritize educational interpretation rather than technological sophistication.

9. Example Workflow

The learning analytics process within SEPI-SIM follows a continuous cycle.

- 1) Learning outcomes define expected competencies.
- 2) Simulation activities generate observable learner performance.
- 3) Standardized assessment instruments collect assessment information.
- 4) Structured feedback supports reflective learning.
- 5) Assessment information is integrated longitudinally.
- 6) Competency dashboards summarize learner progression.
- 7) Educational decisions inform subsequent teaching and learning activities.

This iterative process enables continuous monitoring of competency development throughout simulation-based education.

10. Adaptability

The learning analytics framework is intentionally platform-independent.

Institutions may implement the framework using:

- spreadsheets;
- learning management systems;
- simulation management software;
- institutional dashboards;
- electronic portfolios;
- dedicated learning analytics platforms.

The educational principles described in this framework remain applicable regardless of the technological infrastructure used.

Concluding Remarks

The SEPI-SIM learning analytics framework provides a practical approach for organizing longitudinal assessment information within simulation-based health professions education. By integrating multiple sources of assessment information across successive educational experiences, the framework supports continuous competency monitoring, individualized feedback, curriculum evaluation, and evidence-informed educational decision-making while remaining adaptable to diverse institutional contexts.

Additional File 5

Institutional Implementation Checklist

SEPI-SIM Readiness Assessment Tool for Health Professions Education Programs

This checklist supports educational institutions in evaluating their readiness to implement the Simulation-based Educational Platform for Integrated Assessment and Monitoring (SEPI-SIM). It is intended as a practical self-assessment tool to facilitate planning, identify implementation priorities, and monitor institutional progress during adoption of the framework.

The checklist is not intended as a validation instrument or accreditation standard, but rather as a guide for implementation planning and continuous quality improvement.

Instructions

For each item, indicate the current level of implementation within your educational program.

<i>Rating</i>	<i>Description</i>
0	Not implemented
1	Planning stage
2	Partially implemented
3	Fully implemented

Domain 1. Curriculum Alignment

Item	0	1	2	3
Competency-based learning outcomes have been clearly defined.	☐	☐	☐	☐
Learning outcomes are aligned with simulation activities.	☐	☐	☐	☐
Competency progression is explicitly described across the curriculum.	☐	☐	☐	☐
Simulation activities are integrated within the curriculum rather than isolated events.	☐	☐	☐	☐

Domain 2. Assessment System

Item	0	1	2	3
Diagnostic assessment is performed before simulation activities.	☐	☐	☐	☐
Standardized competency rubrics are available.	☐	☐	☐	☐
Procedural checklists are used consistently.	☐	☐	☐	☐
Multiple low-stakes assessments contribute to competency evaluation.	☐	☐	☐	☐

Domain 3. Feedback

Item	0	1	2	3
Structured debriefing follows every simulation activity.	☐	☐	☐	☐
Learners receive individualized formative feedback.	☐	☐	☐	☐
Self-reflection is formally documented.	☐	☐	☐	☐
Feedback informs subsequent learning objectives.	☐	☐	☐	☐

Domain 4. Longitudinal Competency Monitoring

Item	0	1	2	3
Competency data are collected across multiple educational experiences.	☐	☐	☐	☐
Learner progression is monitored longitudinally.	☐	☐	☐	☐
Competency portfolios are maintained.	☐	☐	☐	☐
Educational decisions are based on cumulative assessment information.	☐	☐	☐	☐

Domain 5. Learning Analytics

Item	0	1	2	3
Assessment information is digitally stored.	☐	☐	☐	☐
Performance data can be visualized longitudinally.	☐	☐	☐	☐
Learning analytics support educational decision-making.	☐	☐	☐	☐
Educational reports are routinely generated.	☐	☐	☐	☐

Domain 6. Faculty Development

Item	0	1	2	3
Faculty members have received simulation training.	☐	☐	☐	☐
Faculty members are trained in competency-based assessment.	☐	☐	☐	☐
Faculty members use standardized assessment instruments consistently.	☐	☐	☐	☐
Faculty members participate in calibration activities.	☐	☐	☐	☐

Domain 7. Quality Improvement

Item	0	1	2	3
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Educational data are periodically reviewed.
Curriculum modifications are informed by assessment results.
Learner progression informs educational planning.
Continuous quality improvement processes are established.

☐	☐	☐	☐
☐	☐	☐	☐
☐	☐	☐	☐
☐	☐	☐	☐

Score Interpretation

<i>Total Score</i>	<i>Institutional Readiness</i>
0–21	Initial stage of implementation
22–42	Early implementation
43–63	Moderate implementation
64–84	Advanced implementation

The score is intended to support internal planning rather than external comparison or accreditation.

Suggested Implementation Priorities

Institutions are encouraged to prioritize implementation according to the following sequence:

- 1) Curriculum alignment with competency-based outcomes.
- 2) Standardization of assessment instruments.
- 3) Structured formative feedback.
- 4) Longitudinal competency monitoring.
- 5) Learning analytics integration.
- 6) Continuous quality improvement supported by educational evidence.

Intended Use

This checklist may be used:

- before implementing SEPI-SIM;
- during phased implementation;
- as part of annual curriculum review;
- during faculty development initiatives;
- to support continuous quality improvement activities.

Closing Remarks

The SEPI-SIM Implementation Package was developed to complement the conceptual framework presented in the accompanying manuscript by providing practical educational resources that facilitate local implementation, adaptation, and future empirical evaluation.

Rather than prescribing standardized procedures, these materials illustrate one possible operationalization of SEPI-SIM and are intended to support educators in translating evidence-informed educational principles into coherent assessment practices. Institutions are encouraged to adapt the resources according to their curricular structure, competency frameworks, available simulation infrastructure, educational technologies, and local educational priorities.

Because SEPI-SIM is presented as a theory-informed educational architecture, continued refinement through implementation studies, psychometric evaluation, and educational research will be essential to strengthen its evidence base. Future investigations should examine its feasibility, educational effectiveness, scalability, and contribution to competency-based health professions education across diverse institutional settings.

The authors hope that this implementation package will serve not only as a practical resource for educators but also as a foundation for collaborative research, continuous educational innovation, and the ongoing advancement of longitudinal competency assessment in simulation-based health professions education.

Availability

The complete SEPI-SIM Implementation Package is intended to accompany the publication of the manuscript "SEPI-SIM: An Educational Architecture for Longitudinal Competency Development in Simulation-Based Health Professions Education" and is archived in the associated Zenodo repository to facilitate open access, transparency, reproducibility, and future educational research.