

Assessment Checklist: Assuring Quality in Student Learning Outcome Assessment

Tracy Herrmann, PhD, R.T.(R), FAEIRS

Student learning outcome (SLO) assessment is an essential component of quality improvement for educational programs of all types. In higher education, SLO assessment is expected to meet accreditation standards at programmatic and institutional levels.¹⁻⁵ However, programs have autonomy in how they conduct SLO assessment, and though the assessment tools, their implementation, and analysis are unique to each program, the overall process of assessment follows a pattern that can be replicated across programs. As such, a common checklist could be helpful to assure that all essential steps of SLO assessment are followed to ensure a high-quality process that meets accreditation standards.

JRCERT Standards for Student Learning Outcome Assessment

The Joint Review Committee on Education in Radiologic Technology (JRCERT) accreditation standards define expectations for academic assessment in radiography, radiation therapy, medical dosimetry, and magnetic resonance imaging educational programs. Standards related to SLO assessment are consistent across these standards, including Objective 1.1 where the sponsoring institution or program must publish the program mission statement, goals, and SLOs.¹⁻⁴ Extensive details regarding SLO assessment are provided in Standard Six: Programmatic Effectiveness and Assessment: Using Data for Sustained Improvement. To meet Standard Six, program effectiveness must be “linked to the ability to meet its mission, goals, and student learning outcomes,” and have a systematic, ongoing assessment process providing credible evidence that enables analysis and critical discussions to foster ongoing program improvement.¹⁻⁴

Use of Checklists to Assure Quality

Checklists have many uses for assuring the quality of a process, practice, or project and are commonly used in industries such as aviation and health care. They can be used to demonstrate completion of important steps in a process; components of a work project; or required safety measures. In health care, checklists have been used to assure safety in surgery, anesthesiology, and the use of medical devices.^{6,7} And in medical imaging, checklists have been applied to best practices in digital imaging and fluoroscopy toward a goal of reducing radiation exposure.^{8,9} In cooperation with the U.S. Food and Drug Administration, the Image Gently campaign created a checklist specifically for pediatric digital radiography that includes critical steps in workflow that affect documentation, radiation exposure, and image quality with the intent of decreasing radiation exposure.⁸ In first-year radiology resident education, the use of a visual and mnemonic preprocedural radiation safety check list for fluoroscopy operators has resulted in reduced fluoroscopic exposure time.⁸ Magnetic resonance imaging screening and emergency preparedness also are guided by screening forms and checklists.¹⁰ These applications show how checklists can be useful in promoting high-quality care and safety in health care processes.

In this article, the JRCERT Standards and associated accreditation resources have been applied to create an SLO assessment checklist designed to ensure completeness and quality in SLO assessment planning and implementation.¹¹ This article will follow the steps in the assessment process and describe the application of the proposed SLO assessment checklist in systematic assessment plan development; implementation of the plan and data collection; analysis of data and sharing with communities of interest; and implementation of changes for improvement.

Systematic Assessment Plan Development

Objective 6.3 calls for a “formalized written assessment plan [that] allows programs to gather useful data to measure the goals and student learning outcomes to facilitate program improvement.”¹¹⁻¹⁴ **Box 1** includes the steps for developing a systematic plan to assess SLOs. Engaging faculty and communities of interest in SLO assessment plan development makes the work explicit to those involved and potentially improves authenticity of the outcomes and assessment tools.

Backward design is an approach that can be used in systematic SLO assessment design. In backward design, the SLOs and measurement tools are determined based on the skills of which graduates should be accomplished.¹² Another helpful approach is to do a curriculum map to show where SLOs are met in each course.^{1-4,13} During the process of writing SLOs, making them explicit, measurable, and well-defined by applying the SMART (specific, measurable, achievable, realistic and relevant, time-bound) acronym is important.¹⁴

The **Table** shows the components of the SLO assessment plan necessary to meet Objective 6.3.¹⁻⁴ The components as defined in the standards include¹⁻⁴:

- 2 SLOs per goal
- 2 assessment tools per SLO
- benchmarks for each assessment method to determine level of achievement
- clinical competency, communication, and critical thinking goals
- timeframes for data collection

Goals are intended to be general statements regarding the 3 areas of learning. SLOs then provide a more detailed description of a specific skill related to student learning in the program based on the goal.

Each SLO must have at least 2 measurement tools, and at least 1 must be a direct measure. A direct measure is an assessment that places a value or score on student learning or performance of student skills. An indirect measure could be a reflection or opinion that is more difficult to quantify.¹⁵ No matter whether direct or indirect, the measurement tool should authentically assess essential student skills based on their learning experience. Application of tools that provide consistent scoring, such as rubrics or skill evaluation forms, are desirable.¹⁶ In total, there are a minimum of 6 SLOs

Box 1

Systematic Assessment Plan Development Checklist¹¹

- ☐ Engage communities of interest in the development of the assessment plan and its components.
- ☐ Review your institutional and program mission statements.
- ☐ Develop program goal statements.
 - ☐ Align goals with the mission statement of the program.
 - ☐ Create goals that are student centered and reflect student learning.
 - ☐ Focus the goals on the end results of learning.
- ☐ Develop specific student learning outcomes (SLOs).
 - ☐ Specific
 - ☐ Measurable
 - ☐ Achievable
 - ☐ Realistic and relevant
 - ☐ Time-bound
- ☐ Develop or identify measurement tools.
 - ☐ Rubric
 - ☐ Test question
 - ☐ Clinical or skill evaluation or practical
 - ☐ Others
 - ☐ Ensure at least 1 direct measure.
- ☐ Set a benchmark for each measurement tool.
 - ☐ Use historic data trends to establish benchmark.
 - ☐ Set benchmark to be attainable with good performance.
 - ☐ Set benchmark above minimum passing score.
- ☐ Establish a timeframe.
 - ☐ Identify who will collect the data from which course and at what point in the curriculum.
 - ☐ Determine the timing for data collection.

to assess and a minimum of 12 measures—not necessarily 12 unique, but 12 total. The same measurement tool might be used for more than 1 SLO. For example, a clinical competency exam might be used to measure communication and radiation safety. In the plan, each measure must have a timeframe, benchmark, data, analysis, and associated improvements.

Implement Plan and Collect Data

Box 2 identifies the next steps in the assessment of SLOs involving implementation of the plan and collection of data from the measurement tools. Program leadership must collect the data from those involved in

Table

Goals Checklist¹¹

Clinical competency	Critical thinking	Communicate effectively
Student learning outcome (SLO) #1	SLO #1	SLO #1
Measurement tool #1	Measurement tool #1	Measurement tool #1
Timeframe	Timeframe	Timeframe
Benchmark	Benchmark	Benchmark
Data	Data	Data
Analysis	Analysis	Analysis
Improvements	Improvements	Improvements
Measurement tool #2	Measurement Tool #2	Measurement tool #2
Timeframe	Timeframe	Timeframe
Benchmark	Benchmark	Benchmark
Data	Data	Data
Analysis	Analysis	Analysis
Improvements	Improvements	Improvements
SLO #2	SLO #2	SLO #2
Measurement tool #1	Measurement tool #1	Measurement tool #1
Timeframe	Timeframe	Timeframe
Benchmark	Benchmark	Benchmark
Data	Data	Data
Analysis	Analysis	Analysis
Improvements	Improvements	Improvements
Measurement tool #2	Measurement tool #2	Measurement tool #2
Timeframe	Timeframe	Timeframe
Benchmark	Benchmark	Benchmark
Data	Data	Data
Analysis	Analysis	Analysis
Improvements	Improvements	Improvements

the assessments and ensure the data are included in the program assessment plan. Values might include average percentage scores or scores based on rubric or Likert scales that are calculated from the raw student assessment results. Data reported also should include the number of students evaluated (ie, sample size), and past data (eg, 3-5 years) to use for comparison purposes. In addition, collecting data during the learning process (formative) and after completion of the instruction related to the knowledge or skill (summative) is good practice.

Analyze Data and Share With Communities of Interest

In Objective 6.4, to ensure that a program meets its mission, goals, and SLOs, the program must analyze and share “student learning outcome data to facilitate

ongoing program improvement.”²¹⁻⁴ **Box 3** shows the key steps in analyzing data and sharing with communities of interest. The program officials must analyze the data for each SLO, including identifying inconsistencies. The next step is to determine if the benchmark was met and compare results with past assessments. Avoid common data analysis errors by using clean data; considering outliers without becoming fixated on them; analyzing metrics in context; and looking at trends throughout time.^{17,18} Program officials should discuss results, including positive and concerning results, and then develop a plan of action to address areas that need improvement. If ongoing, previous improvements also should be discussed and documented. Review for appropriateness and reflect on the SLOs, measurement tools, timeframes, and benchmarks. Finally, the

Box 2

Implement Plan and Collect Data Checklist¹¹

- ☐ Collect actual data results for each measurement tool.
 - ☐ Average percentage score
 - ☐ Average score based on rubric or Likert scale (include scale)
- ☐ Include number of students evaluated (sample size).
- ☐ Include past 3 to 5 years of data results for comparison purposes (trend data).
- ☐ Consider formative and summative data.

Box 3

Analyze Data and Share with Communities of Interest Checklist¹¹

- ☐ Analyze data for each SLO.
- ☐ Identify inconsistencies in the data.
- ☐ Determine if the benchmark was met.
- ☐ Review data trends and compare with past assessments.
- ☐ Discuss positive and concerning results.
- ☐ Develop an action plan.
- ☐ Indicate updates from previous action plans with signs of improvement and document data from action plans until benchmark(s) met.
- ☐ Review the SLO to determine if it is still appropriate.
- ☐ Reflect on the effectiveness of the measurement tool in relation to the SLO.
- ☐ Review the timeframes and benchmarks for appropriateness.
- ☐ Share data, benchmarks met or not met, analysis, and actions with communities of interest.
 - ☐ clinical competence
 - ☐ communication skills
 - ☐ critical thinking
- ☐ Document the analysis of the data and how it was shared with communities of interest in meeting minutes and other pertinent assessment records.

data, analysis and actions should be shared with communities of interest for feedback with all processes and decisions documented in meeting minutes or other assessment records.

Box 4

Implement Changes for Improvement Checklist¹¹

- ☐ Implement ideas or action plans that come from the analysis of data.
- ☐ Determine which faculty or staff will implement the new ideas and plans in which courses.
- ☐ Determine which benchmarks will be updated and the timing.
- ☐ Notify those affected.
 - ☐ students
 - ☐ faculty
 - ☐ clinical preceptors and staff
 - ☐ managers
- ☐ Reevaluate the changes as needed.
- ☐ Document the action plan, implementation, and results in meeting minutes and other pertinent assessment records.
- ☐ Complete and document a holistic review of your assessment plan in consultation with communities of interest at least every 3 years.
 - ☐ mission
 - ☐ goals
 - ☐ assessment plan

Implement Changes for Improvement

Box 4 provides a checklist for implementation of improvements in the program as determined by SLO assessment analysis. These steps meet Objective 6.5, indicating the “program periodically reevaluates its assessment process to assure continuous program improvement”.¹⁻⁴ After data analysis, the program officials implement new ideas and action plans. Benchmarks and timing should also be updated, as appropriate. Those affected by changes for improvement, such as students, faculty, clinical preceptors, clinical staff, and managers, should be notified. The changes implemented should be reevaluated periodically to make sure they are having a positive effect. Implementation of the action plan and improvements must be documented in meeting minutes and assessment records. Finally, a holistic review of the assessment plan with communities of interest must be conducted at least every 3 years, including a review of the mission, goals, and assessment process.

The table and boxes in this article are components of a complete assessment checklist that can be downloaded from the JRCERT website and used to check for a quality SLO assessment plan.¹¹ Additional JRCERT resources are available to support development of program assessment processes for medical imaging programs such as:

- example of an assessment plan¹⁹
- JRCERT Update articles²⁰
- JRCERT online courses and workshops²¹
- sample of meeting minutes²²
- syllabus for developing an outcomes assessment plan²³

Conclusion

SLO assessment is essential to ensure continued program improvement and curriculum renewal. Implementing the steps provided on the checklist will support implementation of evidenced-based decision-making processes to support program improvements.

Tracy Herrmann, PhD, R.T.(R), FAEIRS, recently completed her term on the Joint Review Committee on Education in Radiologic Technology board of directors and is associate dean of academic affairs and professor of allied health at the University of Cincinnati Blue Ash College in Ohio.

References

1. Standards for an accredited educational program in radiography. Joint Review Committee on Education in Radiologic Technology. Published January 2021. Accessed October 13, 2023. <https://www.jrcert.org/jrcert-standards/>
2. Standards for an accredited educational program in radiation therapy. Joint Review Committee on Education in Radiologic Technology. Published January 2021. Accessed October 13, 2023. <https://www.jrcert.org/jrcert-standards/>
3. Standards for an accredited educational program in medical dosimetry. Joint Review Committee on Education in Radiologic Technology. Published January 2021. Accessed October 13, 2023. <https://www.jrcert.org/jrcert-standards/>
4. Standards for an accredited educational program in magnetic resonance imaging. Joint Review Committee on Education in Radiologic Technology. Published January 2021. Accessed October 13, 2023. <https://www.jrcert.org/jrcert-standards/>
5. CHEA standards and procedures for recognition. Council for Higher Education Accreditation (2021). Accessed November 10, 2023. https://www.chea.org/sites/default/files/other-content/CHEA_Standards_Procedures_for_Recog-FNL-Sept.23.pdf
6. Haugen AS, Sevdalis N, S fteland E. Impact of the World Health Organization Surgical Safety Checklist on patient safety. *Anesthesiology*. 2019;131(2):420-425. doi:10.1097/ALN.0000000000002674
7. Clay-Williams R, Colligan L. Back to basics: checklists in aviation and healthcare. *BMJ Qual Saf*. 2015;24(7):428-431. doi:10.1136/bmjqs-2015-003957
8. John SD, Moore QT, Herrmann T, et al. The Image Gently pediatric digital radiography safety checklist: tools for improving pediatric radiography. *J Am Coll Radiol*. 2013;10(10):781-788. doi:10.1016/j.jacr.2013.02.026
9. Leschied JR, Glazer DI, Bailey JE, Maturen KE. Improving our PRODUCT: a quality and safety improvement project demonstrating the value of a preprocedural checklist for fluoroscopy. *Acad Radiol*. 2015;22(3):400-407. doi:10.1016/j.acra.2014.09.004
10. American College of Radiology. (2020). ACR manual on MR safety. Accessed on October 13, 2023 at <https://www.acr.org/-/media/ACR/Files/Radiology-Safety/MR-Safety/Manual-on-MR-Safety.pdf>.
11. Assessment checklist—assuring quality in student learning outcome assessment planning and implementation. Joint Review Committee on Education in Radiologic Technology. Accessed October 13, 2023. <https://www.jrcert.org/wp-content/uploads/2024/01/Assessment-Plan-Checklist-Final-Jan-2024.pdf>
12. Eatmon S. Assessment: working Backward. *Radiol Technol*. 2015;86(6):678-681.
13. Herrmann T, Leggett T. Curriculum mapping: aligning content and design. *Radiol Technol*. 2019;90(5):530-533.
14. Schans B. Student learning outcomes. *Radiol Technol*. 2019;90(3):312-314.
15. Northern Illinois University Center for Innovative Teaching and Learning. Direct vs. indirect assessment of student learning. Accessed on November 10, 2023 at <https://www.niu.edu/citl/resources/guides/direct-versus-indirect-assessment-of-student-learning.shtml>
16. Schmidt LF. Developing classroom and program assessment rubrics. *Radiol Technol*. 2020;92(2):210-213.
17. Leggett TD, Eatmon S. Data analysis: closing the loop in assessment. *Radiol Technol*. 2017;88(5):545-547.
18. Insight Scope. Ten data mistakes to avoid. Accessed November 10, 2023 at <http://insightscope.com/10-data-analysis-mistakes-to-avoid/>
19. Example of assessment plan and analysis associate level-clinical competency goal. Joint Review Committee on Education in Radiologic Technology. Accessed October 13, 2023. <https://www.jrcert.org/wp-content/uploads/2023/03/MR-Assessment-Examples-combined.pdf>
20. JRCERT Update articles flipbook. Joint Review Committee on Education in Radiologic Technology. Accessed October 13, 2023. https://www.jrcert.org/wp-content/uploads/articulate_uploads/1-3-246/JRCERT%20Update%20Articles.html#p=1
21. JRCERT seminars and workshops. Joint Review Committee on Education in Radiologic Technology. Accessed October 13, 2023. <https://www.jrcert.org/jrcert-seminars-and-workshops/>