Oregon Institute of Technology
Medical Imaging Technology Department
Echocardiography Program Assessment
2011-2012

I. Introduction

At this time, OIT's Bachelor of Science in Echocardiography degree is one of only nine in the United States. OIT will provide didactic instruction, clinical observations, leadership and personal training, including advanced skills training. Students are required to complete an 11-month externship at specifically chosen echocardiography laboratories. This externship will provide the hands-on training and patient load requirements necessary to meet the prerequisite requirements for the certifying board agency, the American Registry of Diagnostic Medical Sonographers (ARDMS).

The first OIT cohort for Echocardiography began fall 2008, with 14 students, and additional cohorts of 17 students in the fall of 2009, 20 students in the fall of 2010, and 20 students in the fall of 2011. In the fall of 2012, 24 sophomore students were admitted to the program, anticipating improved employment opportunities upon graduation in 2015. From the beginning of the program in Fall 2008 to the end of Spring term 2012, retention rate in the Echocardiography program was 94%. 12 of the initial cohort of 14 students completed externship, and became the first graduating class in the Echocardiography program. At the beginning of Fall term 2012, 21 students were on externship, 20 were continuing their didactic education, and 24 new students were admitted to the program for a total of 65 students in the current Echo program.

The initial graduating class has been the only one with time to have taken, and for the Program to receive a report on, their success in passing the ARDMS Registry Exam for Adult Echocardiography. All students successfully passed the Registry Exam, on their first attempt.

II. Program Purpose, Educational Objectives, and Student Learning Outcomes

The Echocardiography faculty agreed to adopt the student learning outcomes as suggested by a programmatic accrediting body, the Joint Review Committee on Education in Diagnostic Medical Sonography (JRCDMS).

Echocardiography Program Purpose

The OIT Bachelor of Science program in Echocardiography provides students with the knowledge, clinical skills, values and behaviors to become competent cardiac sonographers.

Echocardiography Program Educational Objectives

1. The program prepares students to utilize diagnostic techniques, sound judgment and good decision making to provide patient services.
2. The program communicates the importance of becoming credentialed in the profession of echocardiography.
3. The program prepares students who think critically, communicate effectively and exemplify professional ethics.
4. The program conveys the importance of becoming life-long learners and responsible citizens.

Expected Program Student Learning Outcomes

Graduates from this program will be able to:

1. The student will demonstrate the ability to communicate effectively in oral, written and visual forms.
2. The student will demonstrate the ability to work effectively in teams.
3. The student will demonstrate an ability to provide basic patient care and comfort.
4. The student will employ professional judgment, discretion, and ethics.
5. The student will demonstrate knowledge and understanding of human gross anatomy, sectional anatomy, and normal and abnormal cardiovascular anatomy.
6. The student will demonstrate knowledge and understanding of cardiovascular physiology, pathology, and pathophysiology.
7. The student will demonstrate knowledge and understanding of cardiovascular physical principles and instrumentation.
8. The student will demonstrate knowledge and understanding of clinical echocardiographic diagnostic procedures and testing.
9. The student will demonstrate an understanding of diverse cultural and humanistic traditions in the global society.

Additional Student Learning Opportunities

Students will be encouraged to attend American Society of Echocardiography (ASE) conferences when held on the west coast or near their externship sites during the student's senior year.

III. Three-Year Cycle for Assessment of Student Learning Outcomes

The faculty also confirmed the assessment cycle planned, as listed in Table 1 below.

Echocardiography Degree Student Learning Outcomes Assessment Schedule	2011-12	2012-13	2013-14
1. The student will demonstrate the ability to communicate effectively in oral, written and visual forms.			X
2. The student will demonstrate the ability to work effectively in teams.		X	
3. The student will demonstrate an ability to provide basic patient care and comfort.	X		
4. The student will employ professional judgment and discretion.			X
5. The student will demonstrate knowledge and understanding of human gross anatomy sectional anatomy and normal and abnormal cardiovascular anatomy.		X	
6. The student will demonstrate knowledge and understanding of cardiovascular physiology, pathology, and pathophysiology.	X		
7. The student will demonstrate knowledge and understanding of cardiovascular physical principles and instrumentation.	X		
8. The student will demonstrate knowledge and understanding of clinical echocardiography diagnostic procedures and testing.			X
9. The student will demonstrate an understanding of diverse cultural and humanistic traditions in the global society.		X	

Table #1 Echocardiography Degree Assessment Cycle

IV. Summary of 2011-12 Assessment Activities

A. Student Learning Outcome #3. The student will demonstrate an ability to provide basic patient care and comfort.

The mapping of this outcome in the Echocardiography courses can be found in Appendix A, Student Learning Outcome-Course Matrices Table A1.

Direct Assessment #1

The faculty assessed this outcome in ECHO 225 in spring term using select questions from various examinations and the Health Insurance Portability and Accountability Act (HIPAA) quiz with sophomore echocardiography and vascular students. The faculty rated the proficiency of students using the performance criteria described in Table #2 below.

Performance Criteria	Assessment Methods	Measurement Scale	Minimum Acceptable Performance	Results
Understands Ultrasound Scope of Practice	Exam 1	% Scale per # of questions used	80% with 80% or higher	100%
Anticipates/responds to patient needs.	Exam 2	% Scale per # of questions used	80% with 80% or higher	100%
Knowledge of Universal Precautions	Exam 3	% Scale per # of questions used	80% with 80% or higher	90%
Knowledge of HIPAA Policies	HIPAA Quiz	% Scale per # of questions used	80% with 80% or higher	85%

Table #2. SLO #3, ECHO 225 exam results, Spring 2012

Students performed above expectations in all categories for PSLO #3. For most students, this course is the first formal introduction to the deeper issues they will face while working with real patients on externship and in full time employment in the echocardiography field. Students usually observe these issues well while on campus and during rotations at Sky Lakes Medical Center, but how they will be affected by situations will be determined while on externship and when they are employed.

As a result of the data, the OIT Echocardiography program faculty had decided to continue the same in-depth coverage in this course to prepare students for the realities they would face in the field.

Direct Assessment #2

The faculty assessed this outcome in ECHO 420 from the 2011–2012 academic year using student competencies for echocardiography as assessed by industry. The faculty rated the proficiency of students using the performance criteria described in Table #3 below.

Performance Criteria	Assessment Methods	Measure Scale	Minimum Acceptable Performance	Results -% with Target or higher
Knowledge of Universal Precautions	Student Competency Evaluation #3, a.	1 – 100% Scale	80% with 80% or higher	100%
Anticipates/ responds to patient needs.	Student Competency Evaluation #3, b.	1 – 100% Scale	80% with 80% or higher	100%
Knowledge of HIPAA Policies	Student Competency Evaluation #3, d.	1 – 100% Scale	80% with 80% or higher	100%
Performs Within the Echocardiography Scope of Practice	Student Competency Evaluation #3, e.	1 – 100% Scale	80% with 80% or higher	100%

Table #3. SLO #3, ECHO 420 extern competencies results

Students performed above the level of minimum acceptable performance in all criteria.

As a result of the data, for the next cycle where these criteria are utilized the performance level will be increased to 90% with a 90% performance or higher.

Indirect Assessment #1

The faculty assessed this outcome in ECHO 420 from the student 2011-12 exit surveys asking them to rate how well the OIT Echocardiography program and their extern site prepared them for this learning outcome #3. The students rated their proficiency using the performance criteria described in Table #4 below.

Performance Criteria	Assessment Methods	Measure Scale	Minimum Acceptable Performance	Results -% with Target or higher
Student rating of how OIT prepared them for outcome #3.	Exit Survey	1 – 4 Scale	80% with a score of 3.0 or better	86.7%
Student rating of how their extern site prepared them for outcome #3.	Exit survey	1 – 4 Scale	80% with a score of 3.0 or better	100%

Table #4. SLO #3 ECHO 420 student self-assessment results

Students rated OIT fairly close. In some individual cases, the preparation provided by OIT was rated higher than that provided by the externship site. Expected was the reporting that OIT provided only satisfactory preparation (2 out of 15 responses). Since OIT does not have the capability to allow echocardiography students access to direct patient care environments, it is felt that the real world setting is one of the significant benefits to be realized by the externship experience.

As a result of this assessment activity, the Echocardiography faculty will meet with the patient care management faculty to improve orientation to what will be met in the setting of hospital facilities. Additional emphasis on patient care will be provided in the Externship Preparation class during the spring term prior to externship.

B. Student Learning Outcome #6: The student will demonstrate knowledge and understanding of cardiovascular physiology, pathology, and pathophysiology.

The Echocardiography faculty conducted an analysis of where this outcome is reflected in the curriculum. The mapping of this outcome in the Echocardiography courses can be found in Appendix A, Student Learning Outcome-Course Matrices Table A2.

Direct Assessment #1

The faculty assessed this outcome in ECHO 333 course during Fall term using the mid-term practical patient history and physical, the final practical imaging exam, and a final exam of pathology images. The faculty rated the proficiency of students using the performance criteria described in Table #5 below.

Performance Criteria	Assessment Methods	Measure Scale	Minimum Acceptable Performance	Results - % with Target. or higher
Evaluates evidence from patient history and physical	Final Practical	% scale of correct	80% with 80% or higher	100%
Performs appropriate physiological tests	Final Practical	% scale per 5 choices used	80% with 80% or higher	100%
Correctly identifies patient pathology	Pathology images final	0 – 100 %	75% with 75% or higher	90.5%
Extends/ Identifies protocols as required by findings	Final Practical	% scale per 5 choices used	80% with 80% or higher	100%

Table #5. SLO #6 ECHO 333 results, Fall 2011

Students performed at or above expectations. It must be noted that the minimum passing score for the average of the two practical examinations is 80%.

As a result of the data, this assessment will be reworked for the next cycle it is used, both in terms of the criteria examined, and the structure of the lab practicals involved, so that the data collected more directly points toward to the defined criteria.

Direct Assessment #2

The faculty also assessed this outcome in ECHO 420 from the 2011–2012 academic year using student competencies for cardiac ultrasound as assessed by industry. The faculty rated the proficiency of students using the performance criteria described in Table #6 below.

Performance Criteria	Assessment Methods	Measure Scale	Minimum Acceptable Performance	Results -% with Target or higher
Evaluates evidence from patient history and physical	Student Competency Evaluation #6, a & b	1 – 8 Scale	80% with a score of 7.0 or better	100%
Performs appropriate physiological tests	Student Competency Evaluation #6, c.	1 – 4 Scale	80% with a score of 3.0 or better	60%** 96%
Correctly identifies patient pathology	Student Competency Evaluation #6,d.	1 – 4 Scale	80% with a score of 3.0 or better	100%
Extends/ Identifies protocols as required by findings	Student Competency Evaluation #6, e.	1 – 4 Scale	80% with a score of 3.0 or better	93.3%

Table #6. SLO #6 results for ECHO 420 student competencies.

Students performed above minimum level of proficiency in all criteria. **Results reported in criteria # 2 have an initial value of 60%. This represents scoring on the part of 9/15 competencies (6 scored it as N/A). Averaging the reported values gives a 96% result. A portion of the first criteria also had several N/A scores, but the results were left as is as the overall average could not have been any lower.

As a result of the data, the Echocardiography Program faculty will discuss adjusting which criteria will be reported on for this section, reflecting industry evaluation. Our feeling is that in echocardiography, many sites may score some areas as N/A as there is no choice in tests that are to be performed. The basic exam is performed for nearly all patients. Variation in which measurements are utilized within the exam may be an option that can be used to modify the criteria.

Indirect Assessment #1

The faculty assessed this outcome in EHCO 420 from the student 2011-12 exit surveys asking them to rate how well the OIT Echocardiography program and their extern site prepared them for this learning outcome #6. The student rated their proficiency using the performance criteria described in Table #7 below.

Performance Criteria	Assessment Methods	Measure Scale	Minimum Acceptable Performance	Results -% with Target or higher
Student rating of how OIT prepared them for outcome #6	2011–2012 Extern Exit Survey	1 – 4 Scale	80% with a score of 3.0 or better	100%
Student rating of how their extern site prepared them for outcome #6.	2011–2012 Extern Exit Survey	1 – 4 Scale	80% with a score of 3.0 or better	86.7%

Table #7. SLO #6 results for ECHO 420 student self-assessment

Students had rated their training in general as preparing them well for Outcome #6. There were 2/15 scores on the site evaluations that were low. These two sites were at opposite ends of the spectrum of sites in terms of size, and process in terms of how they approach training of students.

As a result of the data, no changes will be made in terms of deleting sites. Additional sites will hopefully be added that will allow rotation of sites off the externship on a schedule that will provide all locations the opportunity to evaluate their mentorship pattern.

C. Student Learning Outcome #7: The student will demonstrate knowledge of cardiovascular physical principles and instrumentation.

The Echocardiography faculty conducted an analysis of where this outcome is reflected in the curriculum. The mapping of this outcome in the Echocardiography courses can be found in Appendix A, Student Learning Outcome-Course Matrices Table A3.

Direct Assessment #1

The faculty assessed this outcome in MIT 231 course during Winter term using final exam questions with sophomore echocardiography students. The faculty rated the proficiency of students using the performance criteria described in Table #8 below.

Performance Criteria	Assessment Methods	Measure Scale	Minimum Acceptable Performance	Results -% with Target or higher
Demonstrate understanding of the nature of sound waves	Final Examination Questions	% scale of 3 questions used	75% with 2 or more questions correct	100%
Interpret interaction of ultrasound with various media	Final Examination Questions	% scale of 4 questions used	75% with 3 or more questions correct	90%
Identify component function of the transducer	Final Examination Questions	% scale of 4 questions used	75% with 3 or more questions correct	85%
Apply physical principles to optimize ultrasound images	Final Examination Questions	% scale of 3 questions used	75% with 2 or more questions correct	95%

Table #8. SLO #7 results for MIT 231 final exam questions, Winter 2012

Students performed above expectations in all four categories. The Ultrasound Physical Principles & Instrumentation taught in this course are heavily conceptually and mathematically based. Many of the students have taken the opportunity to take the ARDMS SPI Registry Exam upon completion of the physics classes. Once all have taken the exam, the pass rate will be reported (some may not take the exam until after graduation, when they take the Adult Echocardiography portion of the registry exams).

As a result of the data, the Echocardiography faculty agreed the MIT 231 course met and exceeded the demands of the Echocardiography program.

Direct Assessment #2

The faculty also assessed this outcome in ECHO 420 from the 2011-12 senior extern year, using cardiac scanning competencies where this outcome is assessed by industry. The faculty rated the proficiency of students using the performance criteria described in Table #9 below.

Performance Criteria	Assessment Methods	Measure Scale	Minimum Acceptable Performance	Results -% with Target or higher
Selects appropriate technique(s) for examination	Student Competency Evaluation #7, a.	1 – 4 Scale	80% with a score of 3.0 or better	100%
Adjusts instrument controls to optimize image quality.	Student Competency Evaluation #7, b.	1 – 4 Scale	80% with a score of 3.0 or better	100%
Takes appropriate measurements	Student Competency Evaluation #7, c.	1 – 4 Scale	80% with a score of 3.0 or better	100%
Recognizes and compensates for acoustic artifacts	Student Competency Evaluation #7, d.	1 – 4 Scale	80% with a score of 3.0 or better	100%
Minimizes patient exposure to acoustic energy.	Student Competency Evaluation #7, e.	1 – 4 Scale	80% with a score of 3.0 or better	93.3%** 100%

Table #9. SLO #7 results for ECHO 420 student competencies

Students performed well above the minimum level of acceptable performance. **This initial score reflects a N/A score at one site. The results of the other 14 sites give a overall result of 100% in meeting these assessment criteria.

In view of the high levels of achievements that have been demonstrated, the 2012-2013 values of the same assessment criteria will be examined, and if they continue high, the minimum acceptable performance "bar" will possibly be raised.

Indirect Assessment #1

The faculty assessed this outcome in ECHO 420 from the student 2011-12 exit surveys asking them to rate how well the OIT Echocardiography program and their extern site prepared them for this learning outcome #7. The students rated their proficiency using the performance criteria described in Table #10 below.

Performance Criteria	Assessment Methods	Measure Scale	Minimum Acceptable Performance	Results -% with Target Av. or higher
Student rating of how OIT prepared them for outcome #7.	Exit Survey	% scale per category used	80% with a score of 3.0 or better	100%
Student rating of how their extern site prepared them for outcome #7.	Exit survey	% scale per category used	80% with a score of 3.0 or better	100%

Table #10. SLO #7 results for ECHO 420 student self-assessment

Students rated themselves as being adequately prepared at both the institutional and extern site level. In the majority of cases, the level of training increased once the students had completed their externship. Where score for both the program and externship site remained unchanged at "good," those sites will be observed for the next year to see if level of program preparation has allowed the final score to be "excellent."

V. Evidence of Student Learning

During the 2011-12 academic year, the program faculty formally assessed the student learning outcomes summarized below. Additional details on these assessment activities can be found in the attached assessment report and in department records.

Student Learning Outcome # 3: The student will demonstrate an ability to provide basic patient care and comfort.

Strengths: The information provided indicated adequate preparation for practices that will be encountered in the externship environment. The experiences obtained in actual hospital and clinic settings reinforced and augmented the didactic and limited mock scenarios that were part of the on-campus experience.

Areas needing improvement: There will be additional emphasis to orientation to possible patient care scenarios, and outcomes, that students will encounter upon externship.

Plans for improvement: Increase mock patient care scenarios in patient management classes. Increase discussion about patient care issues within the externship preparation class, incorporating feedback active externing students.

Student Learning Outcome #6: The student will demonstrate knowledge and understanding of cardiovascular physiology, pathology, and pathophysiology.

Strengths: The didactic classes at OIT provide an excellent framework of understanding of these core knowledge areas. The externship experience provides significant reinforcement of core knowledge, and expands the knowledge base and experience level as would be hoped.

Areas needing improvement: Better ability to assess outcomes for the testing criteria in the courses imaging lab settings.

Plans for improvement: Echocardiography faculty will work on design of lab practical testing that better reflects criteria. Adequacy of Competency Evaluations formats will be examined by both the faculty, and externship clinical instructors during tele-conferences during the school year. The forms will be modified as needed to better reflect actual ways students are observed in the field.

Student Learning Outcome #7: The student will demonstrate knowledge of cardiovascular physical principles and instrumentation.

Strengths: Core courses taught on-campus provide an excellent basis for understanding the application of cardiovascular physical principles through instrumentation that is found on current ultrasound platforms.

Areas needing improvement: Continued emphasis to application of ultrasound physics, evidenced by improvements in image optimization as seen in in-campus practical examinations, and as reflected by assessments upon externship.

Plans for improvement: Increase the turn-around time of review of submitted echocardiography studies to give feedback that allows modifications in imaging technique to be made in a more timely manner by students.

VI. Changes Resulting from Assessment.

The addition of an adequate PACS for the echocardiography program was realized late spring term. The capability of increased speed and ease of image review – not only by the faculty, but also by the class as a whole during critique sessions - will greatly enhance the means of providing more immediate feedback about imaging technique, how measurements are performed, and demonstration of the application of ultrasound principles to image optimization. Adequate utilization of the PACS for review of student imaging will be a priority for the faculty.

The manner in which criteria are evaluated during lab practicals will be examined, and modification will be made to testing protocols and algorithms.

Tele-conferencing will be held to provide a means of input from externship clinical instructors on ways to improve the training held on-campus, and modify the assessment methods utilized during the externship experience to better reflect what is actually evaluated in students in the echocardiography profession.

The echocardiography faculty will also track assessment data gathering in a more timely method. This is greatly assisted by now having faculty on-campus that have worked closely together for one school year, and are actively engaged in providing the best educational experience available for students looking for a degree in echocardiography.

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Appendix A
Student Learning Outcome-Course Matrices

SLO #3: The student will demonstrate an ability to provide basic patient care and comfort.

Courses that are shaded below indicate that the SLO above is taught in the course, students demonstrate skills or knowledge in the SLO, and students receive feedback on the performance on the SLO.

I = Introduced; R = Reinforced; E = Emphasized

	Sophomore			Junior			Senior		
Fall	BIO 220	Cardio Phys		BUS 317	HlthCare Mgmt		ECHO 420	Extern	E
	ECHO 320	Cardio Methods		ECHO 333	Echo III	R			
	PHY 217	Physics of MI		ECHO 321	TEE & Stress				
	WRI 227	Tech Writing		SPE 321	Small Group Comm				
Win	ECHO 231	Echo I		BUS 316	TQM		ECHO 420	Extern	E
	BIO 346	Patho I		CHE 210	Clinical Pharm				
	MIT 231	Sono principles I		ECHO 376	Survey of Vas Tech	R			
	Soc Sci	Elective		ECHO 325	Pediatric Echo				
				Hum	Elective				
Spr	ECHO 225	Pt Mgmt	IE	ECHO 385	Lab Mgmt		ECHO 420	Extern	E
	ECHO 232	Echo II	IE	ECHO 334	Echo IV				
	ECHO 332	Invasive Cardio		ECHO 388	Extern Orient				
	BIO 347	Patho II		Comm	Elective				
	MIT 232	Sono principles II		Hum	Elective				

Table A1. Student Learning Outcome #3-Course Matrix
**Subject to change as courses are designed and developed.

Appendix A
Student Learning Outcome-Course Matrices

SLO #6: The student will demonstrate knowledge and understanding of cardiovascular physiology, pathology, and pathophysiology.

Courses that are shaded below indicate that the SLO above is taught in the course, students demonstrate skills or knowledge in the SLO, and students receive feedback on the performance on the SLO.

I = Introduced; R = Reinforced; E = Emphasized

	Sophomore			Junior			Senior		
Fall	BIO 220	Cardio Phys	IE	BUS 317	HlthCare Mgmt		ECHO 420	Extern	E
	ECHO 320	Cardio Methods		ECHO 333	Echo III	R			
	PHY 217	Physics of MI		ECHO 321	TEE & Stress	R			
	WRI 227	Tech Writing		SPE 321	Small Group Comm				
Win	ECHO 231	Echo I		BUS 316	TQM		ECHO 420	Extern	E
	BIO 346	Patho I	IE	CHE 210	Clinical Pharm				
	MIT 231	Sono Principles I		ECHO 376	Survey of Vas Tech				
	Soc Sci	Elective		ECHO 325	Pediatric Echo	R			
				Hum	Elective				
Spr	ECHO 225	Pt Mgmt		ECHO 385	Lab Mgmt		ECHO 420	Extern	E
	ECHO 232	Echo II	IE	ECHO 334	Echo IV				
	ECHO 332	Invasive Cardio		ECHO 388	Extern Orient				
	BIO 347	Patho II	R	Comm	Elective				
	MIT 232	Sono principlesII		Hum	Elective				

Table A2. Student Learning Outcome #6-Course Matrix
**Subject to change as courses are designed and developed.

Appendix A
Student Learning Outcome-Course Matrices

SLO #7: The student will demonstrate knowledge and understanding of cardiovascular physical principles and instrumentation.

Courses that are shaded below indicate that the SLO above is taught in the course, students demonstrate skills or knowledge in the SLO, and students receive feedback on the performance on the SLO.

I = Introduced; R = Reinforced; E = Emphasized

	Sophomore			Junior			Senior		
Fall	BIO 220	Cardio Phys		BUS 317	HlthCare Mgmt		ECHO 420	Extern	E
	ECHO 320	Cardio Methods		ECHO 333	Echo III	R			
	PHY 217	Physics of MI		ECHO 321	TEE & Stress				
	WRI 227	Tech Writing		SPE 321	Small Group Comm				
Win	ECHO 231	Echo I		BUS 316	TQM		ECHO 420	Extern	E
	BIO 346	Patho I		CHE 210	Clinical Pharm				
	MIT 231	Sono principles I	IE	ECHO 376	Survey of Vas Tech				
	Soc Sci	Elective		ECHO 325	Pediatric Echo				
				Hum	Elective				
Spr	ECHO 225	Pt Mgmt		ECHO 385	Lab Mgmt		ECHO 420	Extern	E
	ECHO 232	Echo II		ECHO 334	Echo IV				
	ECHO 332	Invasive Cardio		ECHO 388	Extern Orient				
	BIO 347	Patho II	IR	Comm	Elective				
	MIT 232	Sono principles II	IE	Hum	Elective				

Table A3. Student Learning Outcome #7-Course Matrix
**Subject to change as courses are designed and developed.