HANDBOOK

for

CONTENT CREATORS

A creator's guide for developing surgical skills training modules.

self
Surgical Education Learners Forum

INTUITIVE
Foundation

GLOSSARY

These terms are intended to define and clarify important terms in the context of SELF.

Content developer

An individual or organization who conceptualizes, prototypes, tests, and/or improves training modules.

Learner

Someone who is engaged in the process of acquiring new knowledge, skills, or abilities. Also known as a student or trainee.

Low- and middle-income countries (LMICs)

An economic classification based on a country's gross national income per capita. For 2023, the World Bank classified low-and middle-income countries as those with a gross national income per capita of less than US$ 13,205. A full listing of LMICs is available on the World Development Indicators website.

Low-resource setting

A location in which effective health care services are constrained by issues such as:

a) limited access to medication, equipment, supplies, and devices;
b) unreliable electrical power, transportation, and built environments;
c) insufficient number and training of health care workers;
d) limited access to adequate maintenance and parts; and/or
e) insufficient funding overall.

Open-source

Something that is publicly and freely available for people to access, modify, and share.

Psychomotor skills and learning

Skills that connect cognitive functions and physical movement. Psychomotor learning is demonstrated through physical skills including movement, coordination, manipulation, dexterity, grace, strength, and speed. These actions demonstrate fine or gross motor skills, which are desired for using precision instruments during surgery.

Self-assessment

A learning method that allows people to independently decide whether they have appropriately learned something such as knowledge or skills.

A self-assessment *skills framework* is a tool that allows people to recognize whether they have successfully acquired a skill.

Self-directed learning

Education without direct guidance from teachers or schools. Self-directed learning allows people to choose the subject, form, method, place, and timing of their education. Also referred to as *autodidacticism, self-education, self-learning, and self-teaching.*

Simulation-based training

Involves the use of equipment or computer software to model a real-world scenario. During a simulation-based training, the learner is taught how to perform tasks or activities in a real-world scenario so they will be better prepared should the event actually occur.

Surgical practitioner

Key medical roles involved in surgery such as surgeons, anesthesiologists, midwives, clinical officers, nurses, or students. Surgical practitioners perform surgery both formally — as part of an official scope of practice — and by necessity.

Training module

A package of open-source informational materials to build a surgical training model and the associated training resources needed to train and self-assess skills acquisition using the model.

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HOW TO USE THIS HANDBOOK

This handbook contains information for applying to the SELF: Clinical Skills Training Grant. This handbook includes the following:

- ➔ An overview of Surgical Education Learners Forum (SELF) and the Global Surgical Training Challenge.
- ➔ The vision and general expectations of SELF.
- ➔ A description of the types of training modules that SELF supports.
- ➔ The criteria for grant eligibility.
- ➔ The expectations of the participation of grant recipients.
- ➔ The resources and financial support available through SELF's grants.
- ➔ An overview of how to apply to the SELF: Clinical Skills Training Grant.

Please read this entire handbook before applying for a grant.

If you have reviewed the entire handbook and have questions, or if you would like to speak to someone about a specific concern, please contact Patrick Diamond at patrick.diamond@intuitive-foundation.org.

Section 1: Introduction to SELF

1.1 About the Surgical Education Learners Forum

In resource-constrained settings around the world, many surgical practitioners are unable to access low-cost, simulation-based training. Due to a lack of access to cadavers, animal models, or simulation-based training, many surgical practitioners undertake procedures for the first time on patients. The Surgical Education Learners Forum (SELF) aims to address this problem.

SELF supports the development and evaluation of low-cost surgical training modules. These modules enable skills acquisition for both surgical practitioners and trainees. The modules also include structured opportunities for self-assessment — a learning method that allows people to independently decide whether they have appropriately learned a skill or attained certain knowledge.

SELF aims to create a paradigm shift in surgical training. Through SELF's training modules, surgical practitioners will have access to open-source resources and assessment tools. Each surgical training features a self-assessment framework, which allows surgical practitioners to independently test their newly-acquired skills.

The open-source platform Appropedia hosts all of SELF's training materials. Training materials created through SELF are required to be freely accessible to learners anywhere.

1.2 About the Global Surgical Training Challenge

In 2020, the Intuitive Foundation created the Global Surgical Training Challenge to address the need for accessible and simulation-based surgical training through open-source training modules. Through the challenge, interdisciplinary teams from around the world have designed and tested training modules for use in low-resource settings. Teams have empowered surgical practitioners through our new paradigm of combining open-source learning procedures and skills with self-assessment.

Through critical self-assessment frameworks, each surgical practitioner has the ability to measure their own proficiency and confidence when applying their newly-learned skills.

This approach to skill-acquisition contrasts the traditional apprenticeship model of surgical training, which requires learners to *see one, do one, teach one*.

Instead, SELF is re-imagining this sequence as *see one, teach yourself one, do one*.

As of January 2023, Intuitive Foundation has supported the development of fifteen surgical procedure training modules, as well as extensive integrated skills curricula for pre-hospital and emergency department trauma management. SELF funds the development of additional training modules, which will be added to existing content on Appropedia.

1.3 About Appropedia

Appropedia is an open-source website. It is also a wiki, which is a type of website that allows anyone to add and edit content.

Appropedia hosts all training modules associated with the SELF. Some training modules are completely hosted on Appropedia, while others use it as a unified starting point for their training modules.

Section 2: What are we looking for?

2.1 Our vision

The most comprehensive surgical training programs rely on access to cadavers, live animal training models, and expensive simulation-based training. Without access to such training resources, surgical practitioners in resource-constrained settings often have little hands-on experience before they are expected to operate on patients. SELF addresses the need for lower cost simulation-based training by incentivising the creation of such models. SELF also aims to create a shift in the delivery of simulation-based training.

The current paradigm expects simulation-based training to take place in an academic or clinical setting. SELF aims to decentralize training through self-assessment methods that allow surgical practitioners to learn new skills and test their skills acquisition independently. Along with developing new training modules, grantees will create the self-assessment frameworks for surgical practitioners to test how well they have acquired skills without needing to be inside of a traditional classroom.

Grantees will share their modules with the world through an online community platform called Appropedia, which hosts a growing collection of surgical training modules. These modules contain all the information needed to create a surgical training simulation, perform a training, and assess skills acquisition. The grantees and other external evaluators will evaluate the quality of the open-source modules in order to ensure that modules effectively self-teach the target skills.

2.2 Developing a Proposal

SELF seeks proposals from multidisciplinary teams that can collaboratively create new surgical training modules for anyone to learn a new surgical skill regardless of where they are in the world or where they are in their career.

We encourage innovative proposals that use technology without the need for a high level of digital connectivity. For example, one training module on Appropedia includes a low-cost, easy-to-build cardboard box simulation. All information about the build and its training components must be freely available to users through Appropedia.

SELF welcomes proposals from a wide range of content developers. SELF is open to completely new ideas that consider materials and self-assessment in innovative ways. SELF also invites individuals and teams to adapt existing training materials in line with our framework.

Prospective grantees should have a clear vision of how their training content connects to the development of psychomotor skills among learners. Modules should focus on the acquisition of one or more psychomotor skills needed to deliver a critical step of a specific surgical procedure.

Prospective grantees should highlight elements of procedures that are either technically complex for surgical practitioners or are infrequent enough that surgical practitioners rarely have the opportunity to apply them. Both types of procedures can result in an increased risk of patient mortality, which shows the importance and urgency of SELF's mission.

When considering which surgical skills to target through training, prospective grantees should identify skills that are complex enough to require physical simulations. Learners should already possess basic surgical training, so training modules should go beyond fundamental skills.

Grantees should use their grant to develop an initial prototype as well as a self-assessment framework. They should be prepared to iterate, test, and improve their initial prototype so that future learners are able to practice with a well-designed simulation.

2.3 Clinical Evaluation Protocol Guidelines

Grantees will also draft clinical evaluation protocol guidelines that specify the process and conditions for an independent evaluation of the training module. The goal of the evaluation is to determine whether the training allows clinicians to self-administer the training and acquire target skills to a level of competence and confidence. Once development of a training module is ready for evaluation, Intuitive Foundation will administer the clinical evaluation protocol in partnership with health facilities in low- and middle-income countries. Results will be shared with grantees and will inform improvements to their training module.

Grantees should provide clear guidance/material for each step of the clinical evaluation described below. Grantees are encouraged, but not required, to administer their own version of this same protocol.

2.3.1 PHASE 1: Self-administered training

I. Identification of the study group. Grantees will create a document that clearly describes the intended learner with any prerequisites on language proficiency and previous clinical training/practice, and the number of learners to be enrolled in the study. Learners who have previously performed the targeted skill clinically should be excluded from the study group.

II. Self-training period. Grantees should indicate the period of time and the conditions in which the learner will engage with the training module. During time period the learners will:

a. Self-administer a pre-test of knowledge and confidence.
b. Construct their own simulator from the grantee's module instructions, and
c. Complete the training module with the simulator based entirely on the module accessed through the Appropedia site and all material linked to that site.

There is to be no outside instruction during this period except for "customer support" type help which may be provided if there is difficulty finding or accessing module material, finding local sources for materials, or help with necessary apps that cannot be downloaded.

As applicable, the learners may be provided with a stipend during this period to allow time for self-study and reimbursement for out of pocket simulator materials. Instruments or equipment (other than simulators) may be loaned to study participants.

III. Transition to clinical practice confidence assessment. Teams should provide to the learners a self-administered survey, rubric or checklist for the learner study participants to assess their own degree of readiness to transition to the next phase of evaluation after they have completed phase one. Learners will self-promote into the next phase.

2.3.2 PHASE 2: Evaluation

I. Assess Clinical Evaluation Readiness. At the clinical site where the learner's clinical evaluation will be performed, the evaluators will administer a pre-clinical assessment of readiness to progress to clinical assessment. This may be simulation based, questionnaire based, or use another instrument of the team's choosing for assessment. Learners may fail out of the protocol at this point and continue with traditional instruction if the evaluators deem it is not safe for the learner to proceed to clinical assessment.

II. Clinical Competence Assessment. In a clinical environment, each learner will perform the self-taught clinical skill under observation of an expert clinical proctor for three of the self-taught procedures as they become available at the clinical site. The evaluation sites will be chosen for their volume of the target clinical cases, and willingness to participate under the guidelines. Clinical evaluation sites will manage the credentialing for the learner to be allowed to practice, the assignment of cases, and the provision of proctors/evaluators. The grantee will provide a case report form with a scoring structure and clinical metrics for the expert clinical proctors to use to ensure consistent evaluation of skill. Intervention on the part of the proctor for patient safety will be expected if necessary and should be noted in the case report forms. Teaching by the proctor should not be done until after the requisite number of Clinical Performance Assessment Cases have been performed and evaluated. Learners are encouraged to engage in additional self-study with the materials during the period of time in which they are completing their Clinical Performance Assessment cases.

III. Post evaluation confidence survey. Following the conclusion of the Clinical Competence Assessment, the "Transition to clinical practice Confidence Assessment" survey should be re-administered along with any additional survey or simulation based assessments the grantee wishes to have performed.

2.3 The problem statement

Grantees will be selected on the basis of how well they address the problem statement. The problem statement is our call to action to grantees. It articulates SELF's aims and what we expect grantees to deliver.

SELF aims to enhance training for surgical practitioners in resource-constrained settings through the creation of innovative surgical training modules that allow anyone, anywhere, and at any point in their career to learn a new surgical skill.

Grantees who create modules as part of SELF will make the training content freely available for use on Appropedia. This includes the informational content, instructions for building a training simulation, and the self-assessment for learners. Grants of up to $75,000 may be given to fund development of prototypes.

Section 3: What are we offering?

3.1 Financial support

To support grantees through the development of their training modules, we anticipate funding at least four grants each year. Each proposal may request up to US$75,000 to support the development of each training module. Multiple proposals from the same principal investigator or organization will not be funded simultaneously. Grant applications are reviewed on a quarterly basis.

3.2 Non-financial support

In addition to financial support, grantees have access to a comprehensive set of guides, templates, and other resources. These resources are designed to support the development of effective training modules.

3.2.1 Introductory workshop

An introductory workshop will provide new grantees with the context, knowledge, and tools needed to develop effective training modules. It also creates a space for grantee teams to share their ideas, collaborate, and refine their development plan. Prior to the workshop, grantees will receive a tool to support mapping their new content onto existing skills training materials. The resulting skills map will be integrated into SELF's growing library of skills training content.

3.2.2 Package of tools

Grantees will have access to tools for developing their training modules. These include a comprehensive library of how-to materials on Appropedia, as well as access to more than a dozen existing skills training modules.

3.2.3 Technical support

Grantees have access to a group of trusted consultants who can provide technical support on various aspects of the content development process. Such support is available at no-cost to the grantee. Consultants have advanced knowledge of the SELF program and are equipped to advise on a wide range of technical issues. Technical support is available related to:

- ➔ Frameworks and tools for self-assessment of skills
- ➔ Low-cost manufacturing
- ➔ 3D printing
- ➔ Web development for Appropedia

3.2.4 Peer-to-peer support

Intuitive Foundation has previously supported the development of more than a dozen training modules. SELF provides connections to other content developers as an additional means of support.

Section 4: Who can enter?

4.1 Eligibility criteria

1. Grantees must be a non-profit organization or academic institution.
2. Proposal must designate a principal investigator who is from and/or based in a low- or middle-income country as defined by the World Bank.
3. Training materials developed through SELF must be publicly available and free-to-use on Appropeia, an open-source platform based on MediaWiki tools.
4. The total cost for any grant may not include more than 20% indirect costs.

4.2 Grantee expectations

Grantees will be expected to use any funding received through SELF for the purposes of developing the proposed training. Examples include the following:

1. Developing or testing the training;
2. Costs for staff working on your training; and/or
3. Engaging external expertise or advice.

Grantees will be expected to participate fully in specific workshops and other activities designed to support appropriate development of training materials.

Grantees are expected to complete their activities within 18 months.

Section 5: How to apply

5.1 Submitting your proposal

Prospective grantees must submit a proposal online via the Intuitive Foundation's grant website.

An evaluation committee will review proposals on a quarterly basis. Prospective grantees who submit their proposals during the final week of a quarter will be included in the following quarter for review. Prospective grantees will receive notifications on the status of an award after the committee has completed their quarterly review. Grant funding will be available after the execution of a grant agreement.

5.2 Evaluation criteria

This section outlines the criteria that our evaluators will use to assess grant proposals. There are eight evaluation criteria, and the information provided below will help you understand what the evaluators will be looking for when making their decisions.

- Clarity of goals and objectives;
- Filling an unmet need;
- Evidence that the existing skills-training content can teach skills when administered in a traditional teaching environment;
- Evidence that the submitting team has the clinical, technical, and educational knowledge and experience needed to develop quality training content;
- Estimated outcomes and impact of increasing the proposed procedure or skill on the health of the patient population in low- and middle-income countries;
- Global accessibility and buildability of any physical tools and/or simulators that are required for skill acquisition;
- Quality and appropriateness of the self-assessment framework being proposed; and

- Appropriateness of the proposal's defined scope, timeline, and budget.

5.3 Pre-application Checklist

This section lists many of the requirements to consider when developing a proposal.

Successful proposals will:

- ☐ Designate a principal investigator who is from and/or based in a low- or middle-income country as defined by the World Bank.
- ☐ Be led by a non-profit organization or academic institution.
- ☐ Make training materials publicly available and free to use.
- ☐ Limit indirect costs to 20% or less (max of US$15,000)
- ☐ Develop training content that will be self-administered by learners.
- ☐ Create simulators that use low-cost materials that are commonly available in low-resource settings.
- ☐ Emphasize psychomotor skill development.
- ☐ Target skills that are either technically complex and/or are called upon infrequently enough that surgical practitioners rarely have the opportunity to apply them.