OpenLab Methodology Guidelines

Version 01
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SKILLS FOR LIFE
OpenLab Network
www.openlabnet.eu

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Welcome to the world of modern educational laboratories brought to you by the **OpenLab Network**.

The OpenLab Network provides students, teachers, and the public with access to advanced scientific equipment and hands-on learning experiences. Professionally guided programmes introduce visitors to real research methods, helping them understand how science works through direct experimentation rather than passive observation.

By making life sciences accessible, engaging, and relevant, the OpenLab Network fosters curiosity, strengthens critical thinking, and builds trust in science. It offers a space where scientific knowledge becomes tangible and understandable for everyone.

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SKILLS FOR LIFE. Experience and enjoy OpenLab!

CONTENT

1. INTRODUCTION

1.1. CONTEXT AND SIGNIFICANCE

Life sciences are rapidly evolving and increasingly interconnected with emerging fields such as digital technologies and artificial intelligence. Schools, however, often lack the equipment, expertise, or capacity to bring contemporary scientific methods into everyday teaching.

OpenLab addresses this gap by:

- offering a fully equipped laboratory environment accessible to schools and the public,
- enabling experiments and activities beyond typical classroom capabilities,
- translating current scientific knowledge into attractive, comprehensible programs,
- connecting educational institutions with research organisations and experts.

Through these functions, OpenLab contributes to the modernisation of regional education systems and strengthens the societal role of its hosting institution by supporting high-quality science outreach and public engagement.

*More detailed communication and positioning guidelines are provided in the **OpenLab Communication Guidelines**.*

1.2. OPENLAB MISSION

We make life sciences attractive, accessible, and relevant for everyone. Through hands-on experiences, we nurture curiosity, critical thinking, and informed decision-making. Our mission is realised through the following goals:

Accessible and Inclusive Science:
We create an open, affordable, and welcoming learning environment for students, teachers, and the general public.

Inspiring Lifelong Learning:
Our programs encourage exploration, creativity, and personal growth. We support teachers in enhancing both subject knowledge and teaching practice.

Critical Thinking and Trust in Science:
We promote evidence-based reasoning and help learners navigate misinformation by understanding scientific principles and practices.

Building a Sustainable Future:
By connecting education with real-world applications, we support employability, innovation, and responsible societal development. Sustainability is anchored in professional staff, diversified funding, and strong, long-term partnerships.

Visibility and Recognition:
We build a trusted and recognisable OpenLab brand that is known for high-quality education and strong community engagement.

1.3. OPENLAB VISION

We aim to become a leading international network of learning laboratories in life sciences.

Our vision includes:

Inspiration and Guidance:
Supporting learners of all ages—from primary school to university—through a structured pathway of progressively advanced programs.

Modern and Innovative Education:
OpenLabs responds to new scientific discoveries and societal needs, communicating science in ways that are engaging, trustworthy, and easy to understand.

Exploration Through Practice:
We offer authentic hands-on experiences that reveal the processes behind real scientific work. Visitors learn through doing, not watching.

Community and Networking:
We develop a connected community, the OpenLab Network, that collaborates, shares best practices, and strengthens the professional identity of lecturers and tutors.

System-wide Integration:
OpenLab aims to become a recognised, stable part of the regional and national **education ecosystem** — a trusted tool for schools, teachers, and policy-makers. It is designed not as a temporary project, but as a long-term, system-relevant element of modern science education.

1.4. TARGET GROUPS: OPENLAB'S AUDIENCE AND USERS

The primary audience consists of lower and upper secondary school classes. This age group is naturally curious and open to new knowledge, making OpenLab an effective tool for supporting scientific literacy and future career choices. In an era of overwhelming information, OpenLab helps young people build critical thinking skills and scientific awareness.

Beyond schools, OpenLab serves multiple target groups:
Students (6–19 years):
Participants in school courses, afternoon workshops, and summer camps. OpenLab broadens their understanding of career options in life sciences and helps identify and support talented individuals.

Educators and Teacher Students:
Teachers use OpenLab as a source of inspiration and professional development. They participate in specialised programs, internships, and training sessions, and integrate OpenLab materials into their teaching.

General Public:
Science fairs, festivals, and public events introduce OpenLab activities to wider audiences and cultivate positive attitudes toward science.

Researchers and Academics:
Researchers contribute expertise, develop course content, and use OpenLab for outreach and talent development. Tutoring improves their communication and pedagogical skills.

2. ORGANIZATIONAL STRUCTURE

OpenLab operates as a **cross-border educational network** supported by strong local teams and diverse institutional partners. Each OpenLab adapts its organisational model to local conditions while remaining aligned with the shared mission, vision, and standards of the OpenLab Network. This flexible structure allows individual OpenLab to grow sustainably and ensures high quality across the entire network.

2.1. OPENLAB CROSS-BORDER NETWORK

OpenLab is built as a collaborative, international network connecting laboratories in different cities and institutions. The network enables partners to align their strategic goals, share expertise, and amplify their collective impact on education and society. As the network expands, its influence, visibility, and capacity to innovate grow accordingly.

Key benefits of the network:

- **Shared Best Practices:** Continuous exchange of teaching methods, operational experience, and programme innovations.
- **Professional Mobility:** Opportunities for tutors and lecturers to join exchange programmes and learn from partner OpenLabs.
- **Joint Development:** Coordinated creation of courses, shared resources, and collaborative responses to emerging educational needs.
- **Stronger Advocacy:** A larger alliance increases credibility when engaging with local, regional, and EU-level stakeholders.

Because OpenLabs differ in legal status (non-profit, university unit, research institute department, etc.), each operates within the regulations of its host country and follows the internal rules of its hosting institution, in addition to national legislation and the shared OpenLab standards.

INTERNATIONAL BOARD OF HEADS OF OPENLABS

The International Board brings together the heads of all OpenLabs and serves as the main platform for cross-border coordination. Its purpose is to ensure strategic alignment and support the long-term development of the network.

Key responsibilities of the Board:

- **Strategic Development:** Refining and upholding the mission and vision of the OpenLab Network.
- **Knowledge Exchange:** Sharing expertise on course development, operational management, safety standards, and pedagogical innovations.
- **Fundraising & EU Opportunities:** Identifying and preparing joint grant applications and collaborative projects.
- **Tutor & Lecturer Exchanges:** Coordinating mobility programmes that support professional growth.

The Board meets regularly, with the most important gathering being the annual international conference, which brings together leaders, lecturers, and advisors from all OpenLabs.

INTERNATIONAL ADVISORY BOARD

The International Advisory Board consists of respected experts from science, education, communication, and management. Its members serve on a voluntary, unpaid basis, contributing their expertise to strengthen the credibility, visibility, and long-term strategic stability of the network.

Functions of the Advisory Board:

- **Ambassadorship:** Promoting the OpenLab concept within academic, professional, and policy-making circles.
- **Strategic Oversight:** Providing independent guidance to ensure quality, relevance, and integrity across OpenLabs.
- **Visibility & Legitimacy:** Associating the network with established professionals, enhancing trust in the OpenLab brand.

Meetings typically take place alongside the annual international conference, ensuring continuity and alignment with the broader OpenLab Network activities.

2.2. LEADERSHIP AND STAFF

Each OpenLab operates with a compact, multi-functional team. Roles may overlap depending on the size and capacity of the local team, but all core functions should be clearly defined to ensure smooth daily operation and long-term stability.

Key roles typically include:

- **Head of OpenLab:**
  Responsible for strategy, external relations, fundraising, hiring, team leadership, and ensuring alignment with the OpenLab Network. Acts as the primary contact for stakeholders and the Network boards.
- **Administrator:**
  Manages communication with schools, scheduling, bookings, and visitor coordination. Supports tutor recruitment, tracks statistics, and collects feedback.
- **Lecturers:**
  Core teaching staff responsible for course delivery, lab safety, programme quality, and mentoring of tutors. They co-create and improve educational programmes.
- **Tutors:**
  Usually students or young scientists supporting the teaching process. They deliver parts of the courses, assist participants, and provide feedback to improve course design.
- **Lab Manager / Technician:**
  Ensures safe, functional, and well-maintained laboratory operations. Manages inventory, equipment, and basic technical support.
- **PR Specialist:**
  Handles communication with the public through social media and websites. Supports outreach activities and promotes OpenLab programmes.
- **Content Creator:**
  Produces visual, audio, and video materials for communication and documentation.

*Communication workflows and responsibilities related to branding, messaging, visual identity, and communication channels are described in detail in the **OpenLab Communication Guidelines**.*

2.3. PARTNERSHIPS AND COLLABORATION

OpenLab's success relies on diverse and meaningful partnerships. These collaborations enhance programme quality, expand outreach, and strengthen the relevance of OpenLab within the scientific, educational, and regional ecosystems. Partners may include research institutions, universities, schools, public authorities, and actors from the private sector or local innovation economy. Together, they help ensure that OpenLab remains connected to real-world practice and regional development needs.

*Practical guidance for approaching and communicating with partners is provided in the OpenLab **Communication Guidelines**. This chapter focuses on the functional roles and structures of these partnerships.*

HOSTING INSTITUTIONS — ROLE AND BENEFITS

While not mandatory, hosting an OpenLab within a university, research institute, or science centre brings clear advantages: access to infrastructure, expert networks, credibility, and communication channels.

Benefits for hosting institutions:

- stronger public outreach and societal impact,
- engagement with schools, teachers, and future students,
- increased visibility within the region,
- a stable platform for science communication and educational innovation.

Hosting institutions decide the level of integration based on local conditions — from autonomous labs to units fully embedded within institutional structures.

SPONZORS AND PARTNER COMPANIES

Industry partners contribute financial support, materials, equipment, or expertise. Collaborations should always reflect OpenLab's values and ethical standards, particularly in sensitive fields such as pharmacology, biotechnology, or chemical industries.

Partner companies gain visibility, opportunities for employer branding, and access to potential future talent.

COOPERATIVE SCIENTIFIC INSTITUTIONS

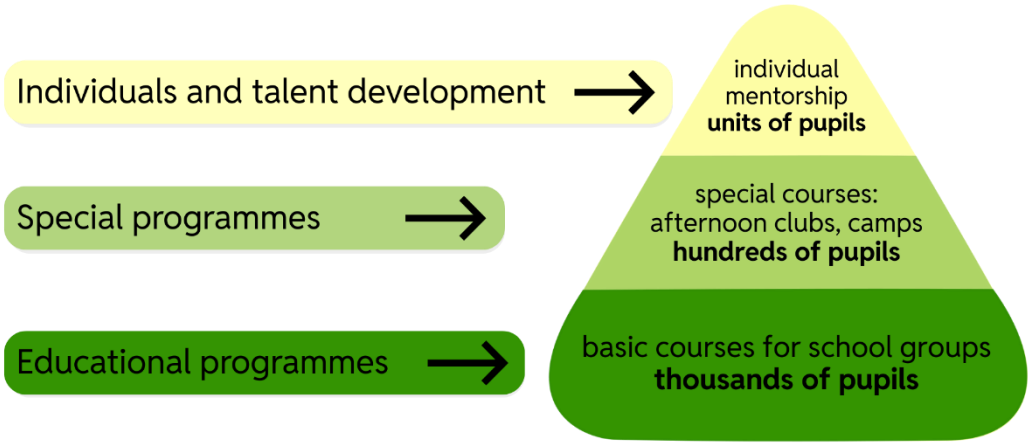
Beyond host institutions, OpenLab collaborates with additional scientific partners. These institutions may provide experts, ideas, occasional use of equipment, or help shape new programmes.

This cooperation increases programme quality and offers researchers a platform for outreach and talent development.

3. PROGRAMME CONTENT

The programme content for pupils reflects the OpenLab educational pyramid, ranging from high-capacity basic courses for school classes, through specialised programmes for groups of motivated youths, to individual support for highly motivated or talented participants.

Programmes are divided into three main categories:



3.1. EDUCATIONAL PROGRAMMES

OpenLab courses for schools are structured around age-appropriate scientific topics and hands-on experiments. Each course follows a standard format that includes:

- **Safety instructions**
- **Introduction**
- **Experimental work** (one or two phases)
- **Summary and discussion**

This unified structure enables hosting institutions to provide schools with high-quality laboratory experiences that complement national curricula and offer learning opportunities beyond what standard school facilities can provide.

PROGRAMMES FOR PRIMARY EDUCATION (AGES 6–10)

Primary school programmes introduce scientific concepts in a simple, engaging, and playful way. Shorter course durations and active learning elements (storytelling, games, drawing, simple puzzles) keep younger children motivated while helping them build early science literacy.

Typical duration: 2 hours (or 3.5 hours including a short break)

PROGRAMMES FOR LOWER SECONDARY EDUCATION (AGES 11–14)

Courses for lower secondary students explore more complex ideas and laboratory techniques. Introductory sections assess prior knowledge and activate curiosity using short quizzes, polls, or brainstorming tasks. Experimental phases emphasise guided practice, basic evaluation, and interpretation of results.

Typical duration: 3.5–4 hours, including a short break

PROGRAMMES FOR UPPER SECONDARY EDUCATION (AGES 15–19 AND ADULT LEARNERS)

Upper secondary programmes introduce advanced experimental tasks, greater autonomy, and deeper scientific discussion. These courses are also well-suited for motivated adults, university applicants, and lifelong learners interested in science, technology, or biotechnology.

Typical duration: 4 hours or more, including a short break(s)

Variations across age levels:
The same thematic content can often be adapted for both lower and upper secondary levels by modifying:

- experimental difficulty,
- degree of independence,
- variations in chemicals or equipment used.

This modularity allows hosting institutions to serve diverse audiences efficiently.

PROGRAMMES FOR TEACHERS AND TEACHER STUDENTS

OpenLab supports teachers by providing practical, modern, and up-to-date science education. These programmes help educators enrich their teaching practice, reduce preparation workload, and stay confident when teaching rapidly evolving scientific topics.

For teacher students, OpenLab offers an opportunity to gain real classroom and laboratory experience before entering the profession, which increases their preparedness and resilience.

Teacher programmes may include:

- **Specialised methodological workshops** that introduce modern teaching approaches and practical strategies for delivering hands-on science lessons.
- **Hands-on laboratory training**, allowing teachers to practice techniques and experiments they can later apply or reference in their classrooms.
- **Internships for teacher students** (in cooperation with universities) that provide authentic teaching experience in a safe, well-equipped laboratory environment.
- **Ready-to-use teaching materials and activity plans** that reduce preparation time and help prevent burnout caused by the high workload many teachers face.

By offering inspiration, practical skills, and professional support, OpenLab helps teachers maintain motivation, confidence, and enthusiasm for science education. These activities also create long-term, trust-based partnerships between OpenLab and regional schools.

*Specific communication and recruitment strategies for teachers are described in the **OpenLab Communication Guidelines.***

3.2. SPECIAL PROGRAMMES

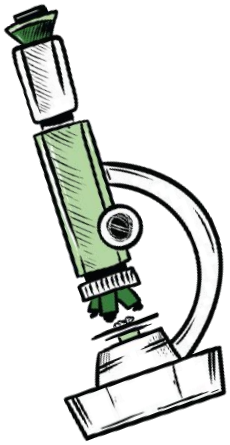
Beyond regular school courses, OpenLab offers specialised activities to support individual learning, talent development, and community engagement.

AFTERNOON "CLUBS" / LEISURE COURSES

Regular courses for motivated students who wish to explore scientific topics in more depth.

Typical duration:

- 60–120 minutes per session
- weekly or bi-weekly format
- multi-week cycles (6–12 weeks)



Recommended number of participants:

- 8–12 students for high-quality interaction
- maximum 15 if supported by an additional tutor

Target group:

- lower or upper secondary students (ages 11–19)
- occasional programmes can be adapted for younger children

Purpose:

- talent development
- longer-term projects and experiments
- developing creativity, teamwork, and problem-solving skills

THEMATIC COURSES FOR THE PUBLIC (HALF-DAY OR FULL-DAY)

Short, intensive workshops that introduce scientific topics to the general public. They help position the hosting institution as an accessible centre of innovation, lifelong learning, and public engagement.

Typical duration:

- half-day: 3–4 hours
- full-day: 6–7 hours including breaks

Recommended number of participants:

- 10–16 participants depending on topic and equipment availability

Target group:

- general public (families, adults, seniors, science enthusiasts)
- school-age participants when accompanied by adults

Purpose:

- promoting science literacy
- community engagement
- offering unique hands-on experiences outside the school system
- team building for companies or professional groups (optional)

THEMATIC SUMMER CAMPS

Intensive multi-day programs for children and teenagers that provide immersive learning experiences. Camps can also serve as a gateway for identifying talented students for further support.

Typical duration:

- 3–5 consecutive days
- daily schedule 4–6 hours depending on age

Recommended number of participants:

- 12–16 participants
- larger groups possible only with additional tutors and suitable premises

Target group:

- children and teenagers (ages 9–19)
- grouping participants by age improves safety and engagement

Purpose:

- deep exploration of scientific topics
- creativity, experimentation, and teamwork
- talent identification for long-term mentoring

INTERNSHIPS FOR TEACHER STUDENTS IN OPENLABS

Organised in cooperation with universities, these internships offer teacher students real teaching experience in a modern laboratory environment. Interns support course delivery, gain practical pedagogical skills, and learn modern approaches to science communication. Hosting institutions benefit by strengthening their educational mission and attracting future talent.

Typical duration:

- semester-long part-time placements
  (Exact structure depends on university requirements.)

Recommended number of participants:

- The number of interns per cycle depends on the team capacity and the number of teacher students enrolled in the cooperating university programme.

Independent internships:

Such internships should be formally agreed upon and documented in a written declaration signed by the Head of the OpenLab. The level of detail included—such as scope, responsibilities, or duration—depends on the individual agreement between the student and the Head of the OpenLab.

Target group:

- university students in teacher education (STEM focus preferred)
- occasionally early-career teachers seeking practical experience

Purpose:

- providing real teaching practice in a safe, supervised lab setting
- improving pedagogical and communication skills
- supporting modernisation of teacher training systems
- building a future workforce for OpenLabs and partner schools

3.3. INDIVIDUALS AND TALENT DEVELOPMENT

In cases where highly motivated or talented individuals require individual mentorship, **OpenLab acts as a gatekeeper**. It identifies such individuals through its programmes and facilitates their connection with suitable mentors from academia, research institutions, or professional practice.

OpenLab maintains ongoing contact with these individuals, supports their further development pathways, and contributes to the visibility of their achievements by promoting their **stories of success**.

4. MANAGEMENT OF PROGRAMMES

Effective programme management ensures high-quality educational experiences, smooth operation of the laboratory, and continuity across the OpenLab Network. This chapter describes the key processes for planning, delivering, and improving OpenLab courses, with a focus on practical steps that can be adapted to the needs and capacities of each OpenLab.

4.1. PREPARATION OF COURSES

Preparing an OpenLab course requires coordination between lecturers, tutors, and the administrative team. The preparation phase includes:

Course planning:

- Selecting or updating the topic based on scientific relevance, school curricula, and available equipment.
- Defining learning goals appropriate for the age group.
- Ensuring alignment with the OpenLab methodology and safety standards.

Material and equipment preparation:

- Checking the availability of laboratory materials, chemicals, biological samples, and consumables.
- Preparing worksheets, presentations, models, or digital tools if needed.
- Testing equipment and running a short technical check of the planned experiment.

Team coordination:

- Assigning roles for lecturers and tutors (lead lecturer, assistant tutor, safety lead).
- Reviewing the course script together to ensure smooth transitions and timing.
- Meeting briefly before each course to clarify responsibilities and expectations.

A clear and consistent preparation process supports course quality, reduces stress for staff, and helps new team members integrate quickly.

4.2. STAFFING REQUIREMENTS FOR PROGRAMME DELIVERY

To ensure safety, smooth laboratory operation, and a high-quality learning experience, OpenLab courses must be staffed appropriately. Each OpenLab is designed to host a full classroom of around 24 (max. 32) pupils during one course.

Lecturer and Tutor Roles:

Each course is led by **at least one lecturer**, supported by a suitable number of tutors.

Primary Education (ages 6–10):

- minimum staffing: 1 lecturer + 3 tutors
- recommended ratio: 1 adult per 4–6 children
  Younger children require greater supervision, assistance with fine motor tasks, and continuous guidance during experiments.

Lower Secondary (ages 11–14):

- minimum staffing: 1 lecturer + 2 tutors
- recommended ratio: 1 adult per 8 pupils
  Students work more independently but need close support during laboratory activities and transitions.

Upper Secondary (ages 15–19):

- minimum staffing: 1 lecturer + 2 tutor
- recommended ratio: 1 adult per 8 students
  Older learners can perform more autonomous tasks, though supervision remains essential for safety, equipment handling, and time management.

Additional staff may be required when courses include groups with special educational needs.

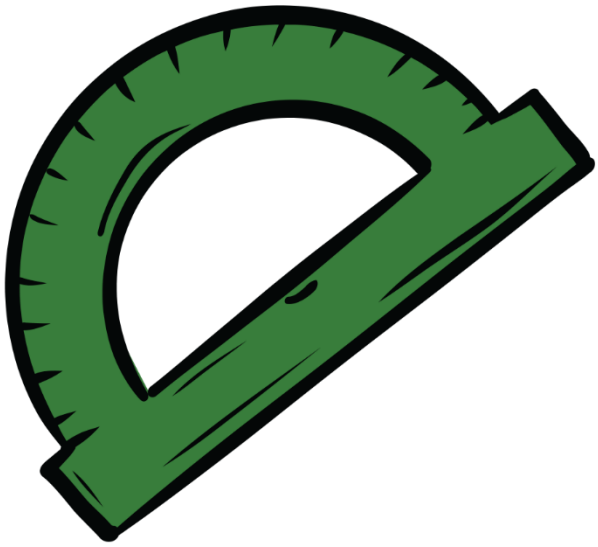
4.3. TEACHING APPROACHES

OpenLab courses use **hands-on, interactive, and student-centred methods**. Each programme is built around real laboratory experiments carried out individually, in pairs, or in small groups. Some courses use **rotating experimental stations** to let students explore multiple aspects of a topic.

OpenLab minimises **transmissive (frontal) teaching**. Instead, lecturers use short quizzes, questions, demonstrations, or brainstorming to activate prior knowledge and maintain engagement.

All activities are **differentiated** according to age and experience. Younger learners receive more structured guidance, while older students work with greater independence. Tutors provide additional support where needed.

Each course ends with a short **reflection and summary**, helping participants consolidate their learning and connect results with real-world applications.



4.4. SAFETY GUIDELINES AND PROCEDURES FOR EMERGENCIES

Safety is an essential part of every OpenLab programme. All courses must follow the safety framework of the hosting institution as well as the shared OpenLab standards.

Before the Course:

- Provide an age-appropriate safety briefing at the beginning of each session.
- Tutors must explain potential risks before any experiment and ensure that participants understand correct handling procedures.
- Ensure that all participants use the required personal protective equipment (PPE).
- Check that chemicals, biological materials, equipment, and tools are prepared and compliant with safety regulations.
- Assign a safety-responsible person (usually the lecturer) for the duration of the course.

During the Course:

- Maintain safe handling and movement in the laboratory.
- Closely supervise the use of sharp tools, chemicals, heat sources, and electrical equipment.
- Tutors support continuous monitoring of behaviour and provide assistance to younger or inexperienced students.

In case of serious injury or sudden illness:

- Ensure the affected individual is immediately assisted by the staff.
- Call emergency services without delay.
- Clear the area and maintain calm among participants.
- Complete an incident report, which must be signed by the Head of OpenLab according to internal reporting rules.

Emergency Procedures:

Each OpenLab must follow the official emergency protocols of its hosting institution, which typically include:

- first-aid steps and internal reporting requirements,
- fire safety procedures,
- chemical spill or exposure protocols,
- evacuation instructions.

Emergency contact information and evacuation maps must be visible and up to date. All staff members (lecturers, tutors, administrators) must be familiar with emergency procedures and know how to report incidents according to internal rules.

4.5. GUIDELINES FOR NEW COURSE DEVELOPMENT

Developing new courses is an essential part of keeping the OpenLab programme 's content modern, engaging, and relevant. The process should be collaborative and transparent, allowing OpenLabs to learn from one another while avoiding unnecessary duplication.

The workflow for new course development follows these steps (based on the OpenLab Network Flowchart, see Appendices 9.1.).

STARTING WITH WHAT ALREADY EXISTS

Before creating a new course, lecturers first check the shared **OpenLab Courses (xls)** table to see whether a similar course already exists.

If a match is found—even partially—they contact the authoring OpenLab and request access to detailed materials. The course can then be adapted to local needs such as timing, equipment, or age group. After a pilot run and final improvements, the course is shared back with the network.

In the Courses.xls table, the OpenLab notes **"Implemented in <Name of OpenLab>"** in the row of the adapted course.

WHEN NO EXISTING COURSE FITS

If no suitable course is available, the need for a new one is registered in the shared Courses.xls table and marked as ***"Under development."***

Lecturers across the OpenLab Network are informed and invited to a short brainstorming, contributing any tips, tricks, ideas, relevant experience, or safety considerations that may help shape the course from the beginning.

1) Designing and shaping the course

The new course is developed using the standard OpenLab template to ensure consistency.

Each course description should include at least:

- name of the course,
- duration,
- target group,
- main goal and relevant parts of the school or national curriculum,
- background and explanation (topic description and explanation of experiments),
- used materials and equipment,
- methodics (a step-by-step description of how the course is delivered),
- attachments, such as worksheets, illustrations, schemes, or printable models.

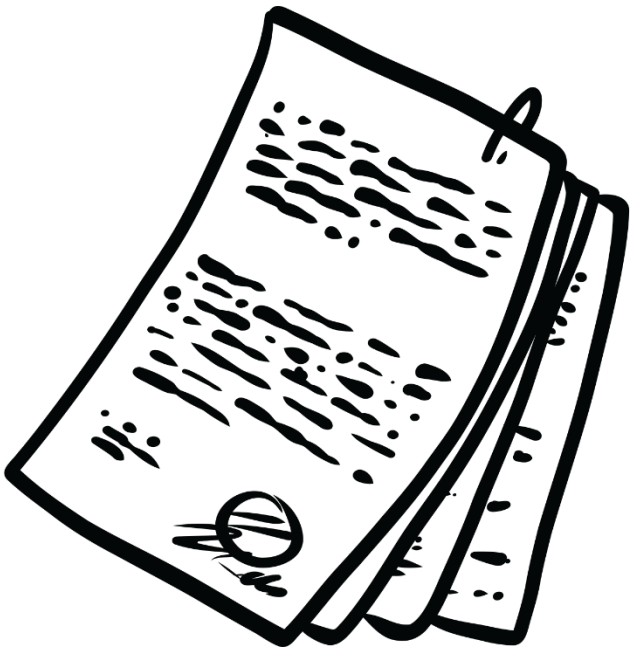
Based on this structure, lecturers design an engaging introduction, plan one or two experimental phases, and prepare all necessary materials and safety notes. Lecturers and tutors often rehearse experimental steps together to refine instructions, estimate timing, and anticipate typical questions or difficulties.

2) Consultation and improvement
A draft version of the course should be shared with colleagues in the OpenLab Network, who are invited to suggest improvements. Their feedback may highlight unclear instructions, identify safety issues, simplify overly complex steps, or propose ways to increase student engagement. Any suggestions received help strengthen the course and ensure smoother delivery.

3) Piloting the course
The course should be piloted—ideally with real students, though an internal pilot is also possible—to identify remaining issues.
The developing OpenLab may encourage other OpenLabs to join the pilot, which offers valuable feedback from different teaching and equipment environments.
In the shared Courses.xls table, the course can be temporarily marked as **"Open for pilot till <date>"**, signalling that additional collaborators and testers are welcome.

4) Finalisation and sharing
After the pilot, the course is improved and finalised: the course script, worksheets, materials list, and safety notes are updated.
The course status in the shared Courses.xls table is then changed to **"Ready to use."**

A shared and transparent workflow ensures strong course quality, reduces duplicated work, and supports meaningful collaboration within the OpenLab Network.



4.6. NEW TUTORS TRAINING

Tutors play an essential role in delivering OpenLab programmes, and their introduction to the team should be supportive, practical, and well-guided. Training helps tutors feel confident in the laboratory, understand OpenLab values, and ensure the safety and quality of every course.

1) Becoming familiar with OpenLab
New tutors begin by learning about the OpenLab environment—its mission, teaching style, and expectations for how we interact with learners. They get an overview of how a standard course works, what role tutors play, and how they support both the lecturer and the participants.

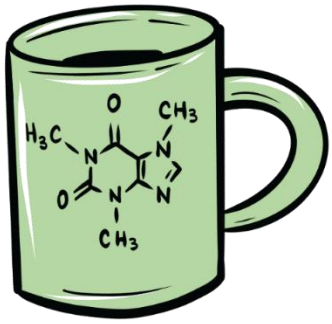
2) Laboratory and safety skills
Before entering teaching activities, tutors practice the basic laboratory skills they will need: pipetting, microscopy, handling chemicals or biological materials, and using personal protective equipment correctly. They are also introduced to safety procedures, emergency steps, and how to communicate potential risks to participants in an age-appropriate way.

3) Course-specific preparation
Tutors review the scripts and materials of the courses they will support and practice the experimental steps with the lecturer. This preparation helps them anticipate timing, transitions, and typical student questions or difficulties.

4) Shadowing and gradual independence
New tutors first observe a full course ("shadowing") to understand the flow and the lecturer's role. They then begin assisting with materials, supporting small groups, and explaining simple tasks. As their confidence grows, they take responsibility for selected parts of the course under supervision, progressing to independent tutoring when the lecturer confirms they are ready.

5) Ongoing development
Tutors receive regular feedback from lecturers and the Head of OpenLab. They are encouraged to join internal training, network activities, or tutor exchanges where available. Their practical observations are valuable for improving courses, and their suggestions are welcomed as part of continuous development.

A clear and supportive onboarding process ensures that tutors contribute to a safe and positive learning environment while growing into skilled and confident members of the OpenLab team.



5. INFRASTRUCTURE AND EQUIPMENT

Appropriate infrastructure and equipment are essential for the safe and effective operation of an OpenLab. Laboratory facilities and technical resources directly influence safety, learning quality, and long-term operability.

This chapter outlines the key infrastructural and equipment-related requirements needed to run OpenLab activities, while allowing flexibility for different organisational models and local conditions.

5.1. LABORATORY FACILITIES

Each OpenLab requires a well-designed laboratory environment that supports safe, engaging, and hands-on learning for whole class groups (typically around 24 participants).

Workspace for Students:
The workspace should comfortably accommodate a full class (approx. 24 students, max. 32). When planning new spaces, it is helpful to consider the **optimal area per student**, as well as clear movement routes for tutors and lecturers.
Each workstation typically includes:

- an experimental table (approx. 1–1.5 m) with a roll container holding everyday laboratory equipment,
- chairs appropriate for varying heights of participants,
- sufficient space between tables for additional materials or for setting up equipment needed during the workshop.

Storage for Chemicals:
Adequate and safe storage is essential and should be considered well in advance when designing or adapting laboratory space.
At minimum, the following should be available:

- a cabinet for low-risk (“harmless”) chemicals,
- a lockable cabinet for solvents,
- a lockable cabinet for acids and bases,
- refrigerators (including a freezer) for temperature-sensitive materials,
- a lockable cabinet for toxic or otherwise hazardous substances.

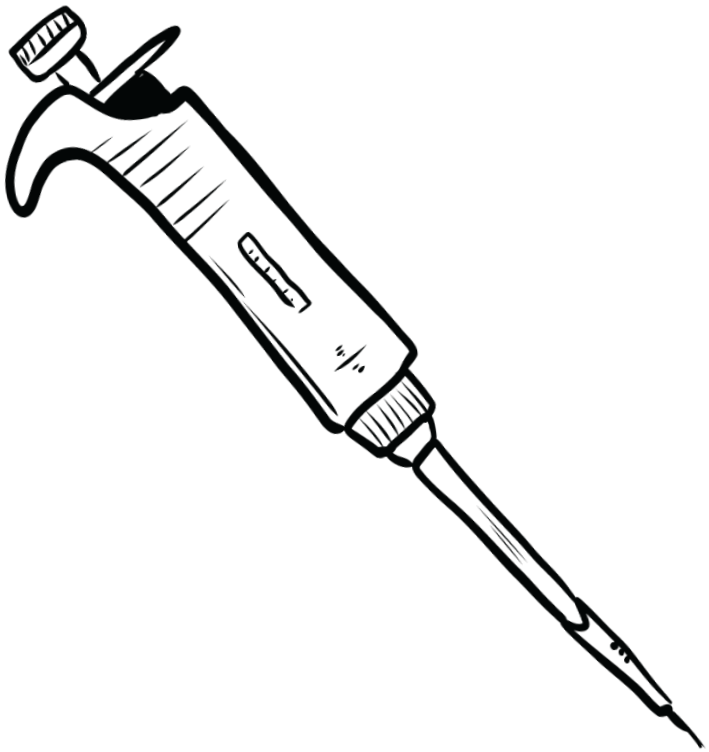
Access to keys for lockable cabinets must be restricted to the OpenLab team.

Storage for Laboratory Equipment:
OpenLabs require substantial storage capacity to keep the laboratory tidy and functional. This includes:

- enough cabinets for basic glassware and equipment,
- storage space or hangers for PPE (lab coats, glasses, shields),
- **reserve or "emergency" storage space** for temporary or overflow items, which is often necessary during busy periods or when running multiple courses.

Considering storage needs early in the planning phase helps prevent organisational issues later.

Preparation Space:
If available, a **separate preparation room** is highly beneficial, especially for more complex experiments. It allows tutors and lecturers to organise materials in advance, prepare reagents, and test individual steps without disrupting the main teaching area.



5.2 ETHICS

All OpenLabs must operate in accordance with the ethical standards of their hosting institutions, national legislation, and EU regulations. Ethical conduct applies to all activities, including work with minors, management of personal data, communication, and the handling of biological or chemically sensitive materials.

Child Protection and Personal Data:
OpenLabs must follow the child protection policies of their hosting institutions and relevant national laws. When working with minors, this includes:

- ensuring the safe and respectful behaviour of all staff members,
- maintaining appropriate boundaries and communication,
- securing parental or institutional consent when required.

Handling of personal data must comply with **EU GDPR** and any additional institutional rules. Contact details, photographs, feedback forms, and participation records must be stored and processed responsibly.

Ethically Sensitive Materials:
When working with materials such as animal tissues, living organisms, or chemicals that present ethical or legal concerns, OpenLabs must ensure full compliance with national and EU regulations.
This includes:

- obtaining all necessary permissions,
- informing participants and teachers in advance about the nature of the materials,
- following proper disposal procedures.

Programmes involving sensitive content should be designed to uphold respect for life, safety, and environmental responsibility.

Inclusivity and Non-Discrimination:
A general code of conduct (Appendices 9.2.) should guide the behaviour of all OpenLab team members and participants. The OpenLab environment must be inclusive, respectful, and free from discrimination based on gender, background, ability, or identity.

Although not all activities are accessible to everyone, OpenLabs are encouraged to prepare **adapted workshops** together with specialised educators to include participants with diverse needs (e.g. visual or hearing impairments). Even partial inclusion should be considered during programme planning.

Responsibility and Good Practice:
Ethical behaviour includes transparency, respect for participants' autonomy, and responsible use of scientific materials and methods. Awareness of ethical standards should be part of tutor and lecturer training, and reflected in everyday practice.

5.3. ACCESS AND BOOKING PLATFORM

Each OpenLab operates a clear and reliable system for booking courses and managing access for schools, teachers, and other target groups. The **booking system reflects the policies and needs of each OpenLab** and ensures transparent communication and fair use of capacity.

Courses are published in advance through an online booking system or another clearly defined access channel. The booking information typically includes available dates, target groups, course duration, capacity, and contact details.

When demand for a specific course exceeds capacity, access is managed in a **coordinated and fair way**. The OpenLab team member responsible for bookings may actively select participants and offer **alternative dates or courses** to other interested schools or groups.

The booking system supports communication before and after the course, including confirmations, practical visit information, and follow-up communication. All organisational and safety information must be provided to teachers and accompanying adults in advance.

All booking systems must comply with **GDPR** and the internal data protection rules of the hosting institution. Personal data is collected only when necessary and stored securely.

5.4. COPYRIGHT AND CREATIVE COMMONS

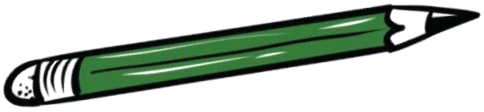
Educational materials created within OpenLabs—such as course templates, worksheets, presentations, visuals, or methodological documents—are shared within the OpenLab Network. All members agree to respect authorship and ensure that materials are used and adapted with proper credit to their original creators.

When materials are published or shared outside the network, the type of license used depends on national legislation and the internal rules of the hosting institution. Where possible and appropriate, the use of **Creative Commons Licenses** is recommended, as they support open access to educational resources while clearly defining conditions of use.

To ensure the traceability and visibility of OpenLab materials, the use of logos, watermarks, or attribution notes is recommended.

Visual materials (e.g. illustrations, diagrams, charts) created within OpenLab may also be published on open platforms such as **Wikimedia Commons**, where suitable. In such cases, it is recommended to use open licenses such as **CC0** or **CC BY-SA**, which allow broad reuse under transparent legal conditions.

Clear licensing supports collaboration, reuse, and wider dissemination of OpenLab educational outputs while protecting the rights of their authors.



6. FUNDING AND SUSTAINABILITY

Securing appropriate funding and planning for long-term sustainability are essential for the stable operation and development of an OpenLab. Financial planning influences the scope of activities, staffing, and the ability to innovate and respond to changing needs.

This chapter outlines key considerations related to operating costs, funding sources, and sustainability planning, providing a flexible framework applicable to different organisational models and local contexts.

6.1. OPERATING COSTS

The long-term operation of an OpenLab requires careful planning of operating costs. The scope and structure of these **costs vary depending on the size of the OpenLab, the frequency of activities**, and the level of support provided by the hosting institution.

When establishing a new OpenLab, it is essential to consider both **recurring costs** and **occasional or development-related expenses**. Clear awareness of these cost categories supports financial stability and sustainable planning.

Personnel Costs

Personnel costs typically represent one of the largest expense categories. In smaller OpenLabs, roles may overlap, while larger OpenLabs may require more specialised positions (detailed in Chapter 2.2). Staffing levels should reflect the volume and diversity of activities. A typical OpenLab team includes:

- Head of OpenLab / Project Coordinator, responsible for strategic planning, supervision, and external communication,
- Lecturers and tutors, who deliver educational programmes and support tutor training,
- Technical support / Lab manager, ensuring safe and functional laboratory operation,
- Administrative support, managing bookings, logistics, and communication,
- PR and outreach support, handling visibility and public communication.

Material and Equipment Costs

Operational costs include continuous restocking of:

- laboratory consumables (glassware, basic chemicals and reagents, gloves, pipettes, biological material),
- protective equipment for visitors and staff,
- educational materials such as worksheets and printed resources.

In addition, OpenLabs require initial and ongoing investment in laboratory equipment. Maintenance, calibration, and gradual upgrades must be planned alongside new purchases.

Operational and Logistical Costs
Further operating costs typically include:

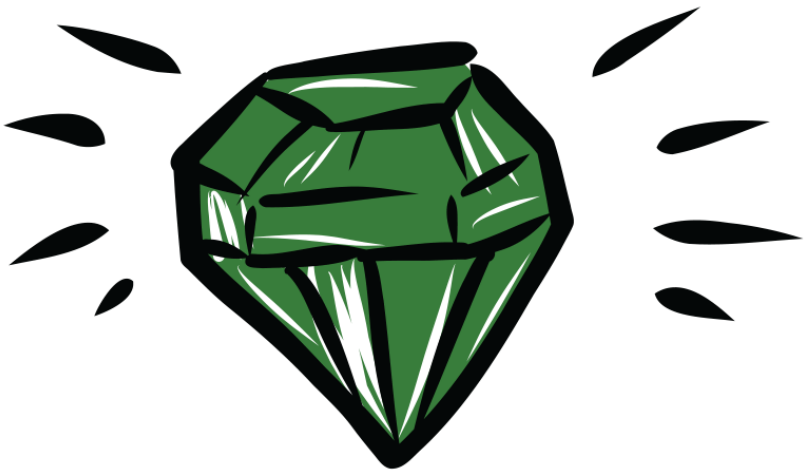
- utilities and laboratory maintenance (electricity, water, waste disposal, cleaning),
- IT infrastructure (websites, booking systems, secure data storage),
- insurance covering property, equipment, staff, and participants,
- travel costs related to outreach activities, training, or network meetings.

Programme Development and Innovation
Resources must also be allocated for:

- development, piloting, and evaluation of new programmes,
- training and professional development of tutors and lecturers,
- quality assurance and continuous improvement activities.

Communication and Promotion
To ensure visibility and sustained demand, OpenLabs should plan for:

- production of communication and promotional materials,
- management of online communication channels,
- organisation of public events and outreach activities.



6.2. FUNDING SOURCES

Ensuring the financial sustainability of an OpenLab requires a **diversified funding model**. Long-term stability is best achieved by combining several complementary funding sources rather than relying on a single one. The exact mix depends on the organisational model, legal status, and local context of each OpenLab.

Core Funding and Organisational Support
Some OpenLabs operate as part of a larger institution (such as a university, research institute, science centre, or non-profit organisation), while others function as independent entities. Where applicable, core funding may come from the **operating budget of a hosting or supporting organisation**, covering personnel, infrastructure, or basic operational costs. In other cases, core funding may be secured through public support, long-term projects, or other stable arrangements.

Public and Grant Funding
Many OpenLabs complement their core funding through:

- national or regional public funding (e.g. ministries, regional authorities),
- project-based grants from foundations or public programmes,
- EU funding schemes supporting education, science outreach, or regional development.

These sources are typically time-limited but play a key role in establishing, developing, or expanding OpenLab activities.

Self-Generated Income
Additional income may be generated through:

- participation fees for selected courses or public programmes,
- paid workshops or special formats for specific target groups,
- contributions from partner organisations.

Self-generated income should remain consistent with the educational mission of OpenLab and support accessibility.

Private Support and Sponsorship
Donations, sponsorships, or in-kind contributions from private companies or individuals may support specific activities, equipment, or events. All such support must comply with OpenLab values, ethical standards, and transparency principles.

Balanced Funding Strategy
A sustainable OpenLab relies on a **balanced funding strategy** that combines stable core funding (institutional, public, or project-based) with external grants, limited self-generated income, and, where appropriate, private support. This diversified approach allows OpenLabs with different organisational models to **operate reliably while remaining flexible and resilient** over time.

6.3. SUSTAINABILITY PLAN

The long-term sustainability of an OpenLab depends on strategic planning, stable operations, and the ability to adapt to changing educational and financial conditions. Sustainability should be considered from the outset and continuously reviewed as the OpenLab develops.

A key element is **financial stability**, achieved through a diversified funding mix that reduces dependence on any single source and allows OpenLabs with different organisational models to function reliably over time.

Equally important is **institutional and organisational continuity**. This includes clear governance, defined responsibilities within the team, and systematic documentation of processes, courses, and know-how to ensure continuity even when staff changes occur.

Human resource sustainability is supported through stable core teams, the structured training of tutors and lecturers, and ongoing professional development. Investing in staff capacity helps maintain quality and prevents overload or burnout.

Programmatic sustainability is ensured by regularly updating course content, responding to feedback from schools and participants, and aligning programmes with current scientific developments and educational needs.

Finally, **network cooperation** strengthens sustainability by enabling knowledge sharing, the joint development of courses, and mutual support among OpenLabs. Active participation in the OpenLab Network reduces duplication of work and increases resilience at both local and network levels.

7. MARKETING AND EXTERNAL COMMUNICATION

Marketing and external communication play a key role in ensuring the visibility, credibility, and long-term sustainability of OpenLab activities. Clear and well-coordinated communication helps build trust among schools, partners, and the wider public, and supports effective use of OpenLab capacities.

This chapter outlines the **strategic role and principles of marketing and communication** within the OpenLab methodology.

*Detailed tools, channels, and operational guidance are described in the dedicated **OpenLab Communication Guidelines** document.*

7.1. PROMOTION

Promotion and external communication are essential for the long-term functioning and visibility of OpenLab. They ensure that OpenLab activities are understood, trusted, and recognised as a valuable part of modern science education.

Promotion must be **strategically planned and coordinated**, not left to spontaneous or ad hoc actions. A structured approach ensures consistent messaging, avoids redundant efforts, and reduces the risk of miscommunication or conflicting information.

To maintain coherence and quality, it is recommended that **one designated person** (e.g. a PR specialist) oversees promotional activities. This role helps ensure a unified voice, coherent branding, and alignment with the long-term vision and values of OpenLab.

*Detailed strategies, tools, and communication workflows are described in the **OpenLab Communication Guidelines** document.*

7.2. COMMUNICATION CHANNELS

Effective communication within the OpenLab network operates on **multiple interconnected levels**—local, institutional, and public. Each OpenLab should maintain **its own official communication channels**, such as a **dedicated website and social media accounts**, to ensure visibility, accessibility, and consistency in outreach.

The choice of channels and messages must be **adapted to the needs of different target audiences**, which typically include:

- **students and teachers** (primary users of OpenLab programmes),
- **scientific institutions and professionals** (partners, mentors, tutors),
- **public and families** (participants in science events),
- **policy makers and funders** (stakeholders in education and innovation),
- **media and influencers** (multipliers of public interest).

All communication should follow the unified **OpenLab Communication Guidelines**, which sets standards for tone, branding, visual identity, and messaging. This ensures that communication is not only effective, but also aligned with the shared vision of the OpenLab network.

OpenLabs are encouraged to build **networks of local contacts**—including schools, regional institutions, and community spaces—and to leverage **both online and offline tools** (e.g. newsletters, partner websites, printed materials, press coverage). The use of social media should be strategic, purposeful, and suited to the audience and platform.

Ultimately, communication is not just about visibility but about building **long-term relationships and trust** with the key audiences.

*The practical guidelines and tools for this are detailed in the **OpenLab Communication Guidelines**, which all members are expected to follow.*

8. EVALUATION AND QUALITY MANAGEMENT

Evaluation and quality management are essential for fulfilling the mission of OpenLab (see Chapter 1.3). Before establishing a new OpenLab, it is important to understand regional interest, stakeholder engagement, and demand for such a concept. While this broader strategic analysis lies outside the scope of this chapter, the focus here is on ongoing evaluation based on visitor feedback and internal data, which supports the continuous improvement and meaningful development of OpenLab activities.

8.1. ASSESSMENT AND FEEDBACK

Evaluation in OpenLab takes place at several interconnected levels:

1. **Municipal and regional stakeholders**
   Feedback is typically collected through annual reports. These are important for long-term funding, accountability, and strategic partnerships.

2. **Hosting or supporting institution (if applicable)**
   An annual summary may be required to demonstrate mutual benefits, visibility, and outcomes of the cooperation.

3. **Internal team**
   Regular self-reflection by tutors and staff is essential. Evaluation may be informal (e.g. short reflections after courses) or part of scheduled team meetings, where teaching methods, organisation, and course content are reviewed. Leadership should also assess tutor performance and development, including training needs. All courses should be regularly reviewed to ensure they remain up to date.

4. **Visitors (school groups and individuals)**
   Feedback from participants—especially school classes, the main target group—is a key source for improving course content, delivery, and the overall visitor experience. Repeated visits from schools are a strong indicator of long-term quality, but this pattern usually emerges only after the OpenLab has been operating for about a year. Therefore, in the initial phase, **direct and structured feedback** is particularly important and should be actively collected.

Feedback should ideally be gathered **within hours to a few days after the course**, balancing immediacy with reflection.

Recommended tools include:

- **Online questionnaires** (QR codes or follow-up emails): concise, ideally no more than 10 questions, combining closed questions with optional open-ended responses.
- **Printed feedback forms:** especially suitable for younger participants, using visual scales (e.g. smileys) and simple prompts.
- **Post-it boards:** allowing spontaneous and anonymous feedback using short guiding questions.

ANALYSIS AND USE OF FEEDBACK

Feedback data should be **systematically analysed**. Closed questions provide clear metrics and support tracking of key performance indicators (KPIs), while open responses offer qualitative insights that inform course updates, tutor training, and strategic decisions.

All courses should be reviewed regularly with regard to content quality, relevance, popularity, and scientific accuracy. Newly developed courses require particularly close monitoring to ensure they meet the expectations of students and teachers. Early feedback helps identify necessary adjustments before a course becomes a stable part of the programme.

Feedback mechanisms should be integrated as a **standard component of programme delivery** to support continuous improvement.

8.2. SUCCESS INDICATORS

Each OpenLab should define and monitor a set of relevant success indicators to evaluate impact and support strategic development. These indicators are also essential for reporting to stakeholders and influencing future funding and partnerships.

Key quantitative indicators include:

- total number of visitors,
- number of courses delivered or booked,
- booking dynamics (e.g. speed of bookings, popularity of specific courses),
- geographical reach (local vs. regional access).

Important qualitative indicators include:

- feedback from participants and teachers,
- public perception and visibility of OpenLab,
- educational value and learning experience, including knowledge gain, skill development, or attitude change.

Social media metrics may support evaluation of communication activities, but they should be treated as **complementary**, not primary, indicators of OpenLab success.

Where possible, indicators should be analysed periodically (e.g. annually) and compared over time to identify trends and guide adjustments in programming, outreach, and funding strategies.

8.3. IMPROVEMENT PROCESSES

Quality management in OpenLab relies on **continuous improvement processes** that ensure programmes remain relevant, up to date, and aligned with user needs and broader scientific, educational, and societal developments.

Improvements are guided by:

- feedback from participants, tutors, and teachers,
- evaluation data and observed trends (see Sections 8.1 and 8.2),
- recommendations from the International Advisory Board or external experts.

Key forms of improvement include:

- **Test runs of new courses**, allowing early identification of weaknesses and logistical issues.
- **Updates to existing courses**, ensuring alignment with current curricula, responsiveness to changing learner behaviour, and integration of user feedback.
- **Development of new courses**, reflecting emerging topics, public interest, and opportunities for interdisciplinary approaches.
- **Integration of new technologies**, where appropriate, to reflect real-world scientific practice and enrich learning experiences.

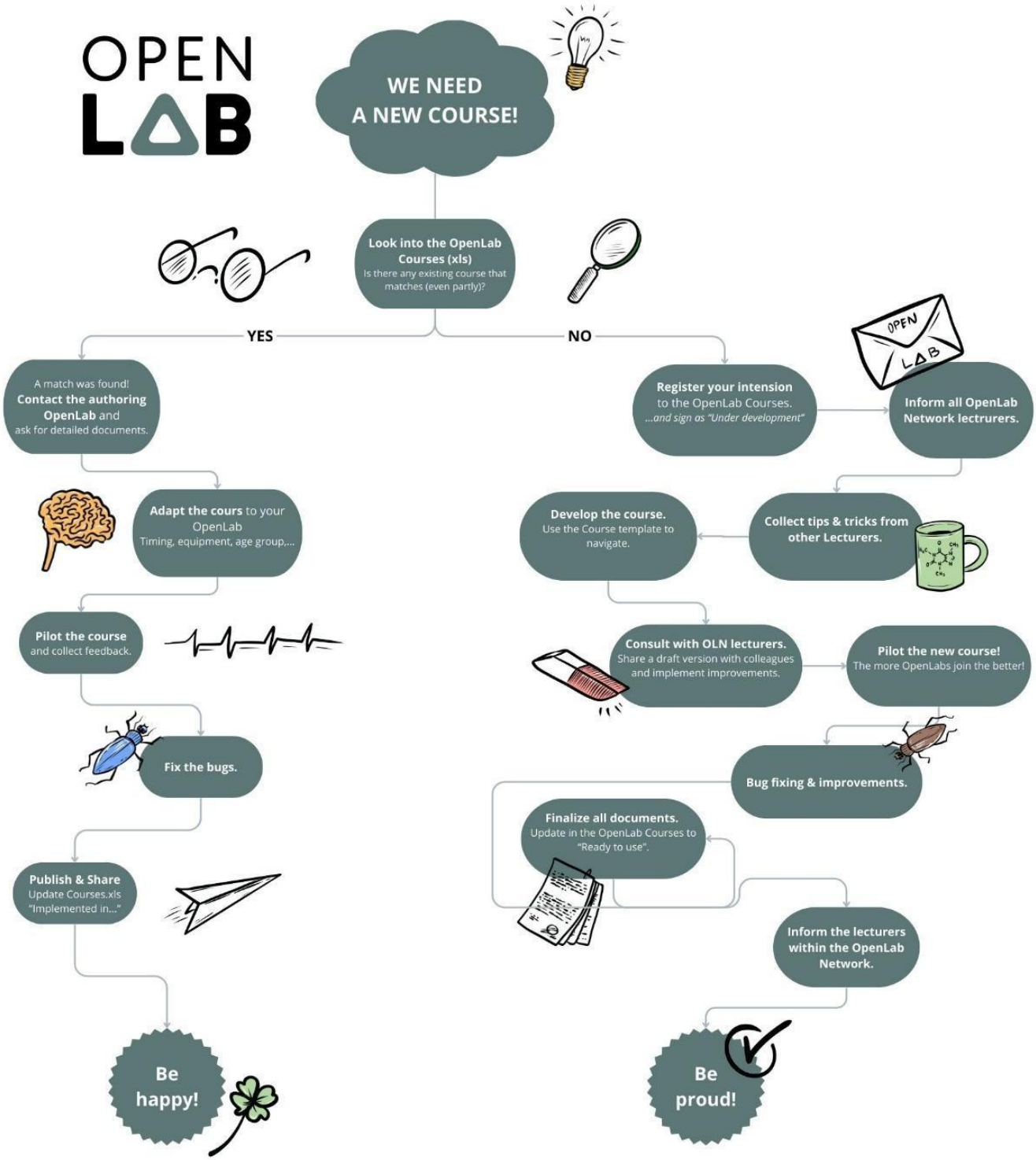
Improvement activities should be documented, reviewed regularly (e.g. annually), and coordinated across the OpenLab Network to support knowledge exchange and consistent quality standards.

8.4. MENTORING AND NETWORKING

Mentoring and networking build on the structures described in Chapter 2.1. The OpenLab Network provides a framework for shared learning, peer mentoring, and professional development. Through collaboration and common standards, the network strengthens quality, visibility, and long-term sustainability of each participating OpenLab.

9. APPENDICES

9.1. NEW COURSE DEVELOPMENT FLOWCHART



9.2. GENERAL CODE OF CONDUCT

(Derived from The Safeguarding Policy of the OeAD, see 9.3. Resource List):

We as OpenLabs are convinced that all participants in our workshops, regardless of age, gender identity, disabilities, faith, sexual orientation, ethnic origin, or other characteristics, have the right to protection from any form of violence and abuse, as well as the right to a safe environment that is free from discrimination and harassment of any kind, including sexual harassment and bullying.

Therefore, the following Safeguarding Policy applies to workshops and all personnel of the OpenLab (fixed staff and tutors) and must be implemented in the work of the OpenLabs.

The following principles apply to all activities:

- We oppose violence in any form (psychological, physical, sexual, verbal).
- We respect the personal and physical boundaries of the participants as well as their individual perception of proximity and distance, thus also refraining from inappropriate physical contact.
- We distance ourselves from discrimination of any kind as well as from the harassment and intimidation of participating individuals.
- We refrain from making inappropriate remarks about, among other things, appearance, clothing, or disability.
- We refrain from bullying in any form and also intervene in cases of bullying by other individuals.
- We prevent the exploitation of an authority and dependency relationship as well as abuse of power.
- We treat participants with respect and uphold their right to privacy.
- We communicate in an age- and target group-appropriate manner and maintain respectful contact with participants via (social) media.

9.3. RESOURCE LIST

Recommended literature, links to relevant websites, and additional materials.

German literature and sources:

- Sommer, K., Wambach-Laicher, J., & Pfeifer, P. (Hrsg.). (2019). Konkrete Fachdidaktik Chemie: Grundlagen für das Lernen und Lehren im Chemieunterricht (2. Aufl.). Aulis Verlag in der Friedrich Verlag GmbH.
- Sauerborn, P., & Brühne, T. (2007). Didaktik des außerschulischen Lernens. Baltmannsweiler: Schneider-Verlag Hohengehren.
- Sommer, K. A., Wirth, J. T. C., & Vanderbeke, M. G. (Hrsg.). (2020). Handbuch Forschen im Schülerlabor: Theoretische Grundlagen, empirische Forschungsmethoden und aktuelle Anwendungsgebiete. Waxmann.
- The safeguarding policy of the OeAD. https://oead.at/fileadmin/Medien/erasmusplus.at/Allgemein/Safeguarding_Policy_OeAD_EN.pdf

English literature:

- Amann, S.; Gaunerstorfer, P.; Gesslbauer, E.; Panuschka, U.; Schmidt, M. (2023). The Safeguarding Policy of the OeAD.

Czech literature:

- Czech Chemical Society Symposium Series. (2019). Použití chemických látek ve výuce a při volnočasových aktivitách žáků. 2019, 17. ISSN 2336-7210. https://www.vscht.cz/files/uzel/67115/0001~~Czg68_DaotIjvdmJCgVF-QpAVmZJak6qQnJGam5mKgA.pdf