PAUL SCHERRER INSTITUT

PSI

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Lessons learned: PSI's Training Center's transition to online learning during the COVID-19 Pandemic

7th ETRAP International Conference on Education & Training in Radiation Protection

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PSI Bildungszentrum Highlights

What makes us unique!

Being
@ the source of knowledge

- **50 Years Experience** in adult education
- **Certified for quality** according to ISO 29990:2010
- **BAG- and ENSI-Accreditation** for radiological safety training in the areas of nuclear facilities and medicine
- **Largest X-ray laboratory in Switzerland**
  10 x-ray units with practical equipment and experimental stations, red light darkroom, digital x-ray capabilities
- **C-/Physics labs** for working with open and sealed sources
- **Outdoor facility Spürgarten** for realistic training of accident situations and radiological events
- **In-house e-Learning production** for the use of modern teaching and learning methods, awarded with Comenius EduMedia Medal 2019 and Seal 2020
- **Training company** for KV apprentices

Radiation Protection Courses

Title	courses/yr	days/course
Strahlenschutz-Ausbildung für Besucherführer/innen von Kernanlagen	1	2
Strahlenschutz-Weiterbildung für Besucherführer/innen von Kernanlagen	2	1
Anerkannte Ausbildung zu Strahlenschutz-Sachverständigen an Lehranstalten (I 15)	1	1
Anerkannte Fortbildung für Strahlenschutzpersonal in Kernanlagen (K1, K2, K3)	3	2
Ausbildung zum/zur Strahlenschutz-Techniker/in (K2)	1	60
Ausbildung zur Strahlenschutz-Fachkraft (K3)	1	80
Ausbildung zur/zum Strahlenschutz-Assistentin/-Assistenten und Vorkurs für die Ausbildung zur Strahlenschutz-Fachkraft	1	10
Vertiefungskurs zur Strahlenschutz-Messtechnik	1	3
Strahlenschutz bei der Dekontamination von Fussböden (Dekont-Reiniger)	1	4
Gesetzliche Grundlagen des Strahlenschutzes in der Schweiz	on demand	3
Anerkannte Ausbildung zu Strahlenschutz-Sachverständigen für die Arbeitsbereiche B und C (I 1)	4	10
Anerkannte Fortbildung für Strahlenschutz-Sachverständige, Arbeitsbereiche B und C (I 1)	2	1
Anerkannte Ausbildung zu Strahlenschutz-Sachverständigen beim Umgang mit Anlagen ohne Voll- und Teilschutzeinrichtung (I 7)	1	2
Anerkannte Ausbildung zu Strahlenschutz-Sachverständigen in der Veterinärmedizin: Anlagen für diagnostische Anwendungen (MA 14)	1	1
Strahlenschutz in der Nuklearmedizin: Praktikum für Radiologiefachpersonen i. A. - Careum BZ Zürich (MP 4)	3	2.5
Strahlenschutz-Einführungkurs für technisches Personal von Röntgenfirmen und Spitälern	1	2
Einführungskurs in das röntgenphysikalische Praktikum (K533) für Röntgenlehrerinnen und Röntgenlehrer von MPA-Schulen	on demand	1
Unterstützung in Fortbildung, Kursinhalt und/oder Einsatzübungen (N 1 bis N 5)	8	1
Ausbildung im Strahlenschutz => Einsatzkräfte ohne Messgeräte (N 5)	on demand	1
Strahlenschutz-Fortbildung für Ingenieure von Kernanlagen	3	1
Strahlenschutz-Fortbildung für zulassungspflichtiges Personal von Kernanlagen	3	
Strahlenschutz-Einführung für Betriebs-/Instandhaltungspersonal von Kernanlagen	3	
Strahlenschutz-Fortbildung für Betriebs-/Instandhaltungspersonal von Kernanlagen		
Strahlenschutz für Lernende am PSI		
Strahlenschutz Einführung für Recycling….		
Ausbildung zur/zum Gefahrgutbeauftragten beim Transport radioaktiver Stoffe (mit Prüfung gem. GGBV)		4
ADR Aufbaukurs, Klasse 7, CZV-Anerkennung 1 Tag (I 17)		1
Transport für radioaktive Stoffe (erlaubt nur den Transport der Klasse 7 und ist nur in der Schweiz gültig) (I 16)	2	2

a snap shot

Radiation Protection Courses

Course objectives, course length, and instructional methods are **dictated by Swiss regulations** and **ensured though accreditation**

Berufsnummer	K 1 a)	K 2	K 3
1: Kenntnisse: aufzählen, skizzieren, benennen, beschreiben, darstellen 2: Verständnis: interpretieren, erklären, erläutern, formulieren, präsentieren 3: Anwendung: anwenden, erstellen, lösen, durchführen, berechnen, gestalten, konfigurieren 4: Analyse: auswählen, einteilen, analysieren, vergleichen 5: Bewertung: beurteilen, entscheiden, urteilen, klassifizieren, evaluieren (Der Vergleich der Gewichtung ist nur innerhalb der Berufsnummer möglich)	Sachverständige für Kernanlagen	Strahlenschutztechnikerinnen und -techniker	Strahlenschutzfachkräfte
Ausbildungsinhalte			
Naturwissenschaftliche Grundlagen, Strahlenphysik, radioaktives Material			
Aufbau der Atome, Nuklidkarte	4	2	2
Radioaktive Zerfälle und Strahlenarten	3	3	2

	K 1 b)	K 2	K 3
	Sachverständige für Kernanlagen	Strahlenschutztechnikerinnen und -techniker	Strahlenschutzfachkräfte
Aus- und Fortbildungsumfang			
Empfohlene Anzahl Unterrichtseinheiten inklusive Praktikum während des Lehrgangs [a)]	200	480	720
Empfohlene Dauer des begleiteten Praktikums nach Abschluss des Lehrgangs in mindestens zwei Kernanlagen	80 h	–	240 h
Geforderte Periodizität der anerkannten Fortbildung in Jahren	3	3	3
Anzahl Unterrichteinheiten einer Fortbildung [a)]	16	16	16
Anerkennungspflichtige Fortbildung notwendig	ja	ja	ja

Es bedeuten:

a): Unterrichteinheiten von mindestens 45 Minuten Dauer.

b): 12 Monate Berufserfahrung im Strahlenschutz (inkl. derjenigen, welche als Voraussetzung für den Kursbesuch gefordert ist), davon 6 Monate in der Kernanlage, in der die Kandidatinnen/Kandidaten als Strahlenschutz-Sachverständige tätig werden sollen.

Radiation Protection Courses

- **6 permanent staff** teach and coordinate all radiation protection courses
- Additional content/lessons provided by: **PSI internal SMEs**; regulating agencies; and professionals in the medical field, nuclear industry, emergency response, etc.
- Our **stakeholders/important clients** come from nuclear power plants, emergency organizations, medical associations, and educational institutions

Pandemic Timeline

March 16
start full lockdown

a 2-week course is stopped mid-way
a 4-month course in the final exam stage is permitted to be completed

March – June
full lockdown

3 courses taught fully **online**
29 courses **cancelled or re-scheduled**

June 8
return to in-person classes

with adherence to strict safety measures

October - today
mandated online instruction

permitted to be continue in blended format, additional safety precautions

«Triage»

After the full lockdown

Online

- Practicals replaced by demo/not required
- Site-tours replaced with live stream

Reschedule

- Certification requirements extended by regulators
- Legally required hands-on experience

Cancel

- Certification requirements extended by regulators
- Legally required hands-on experience

Blend

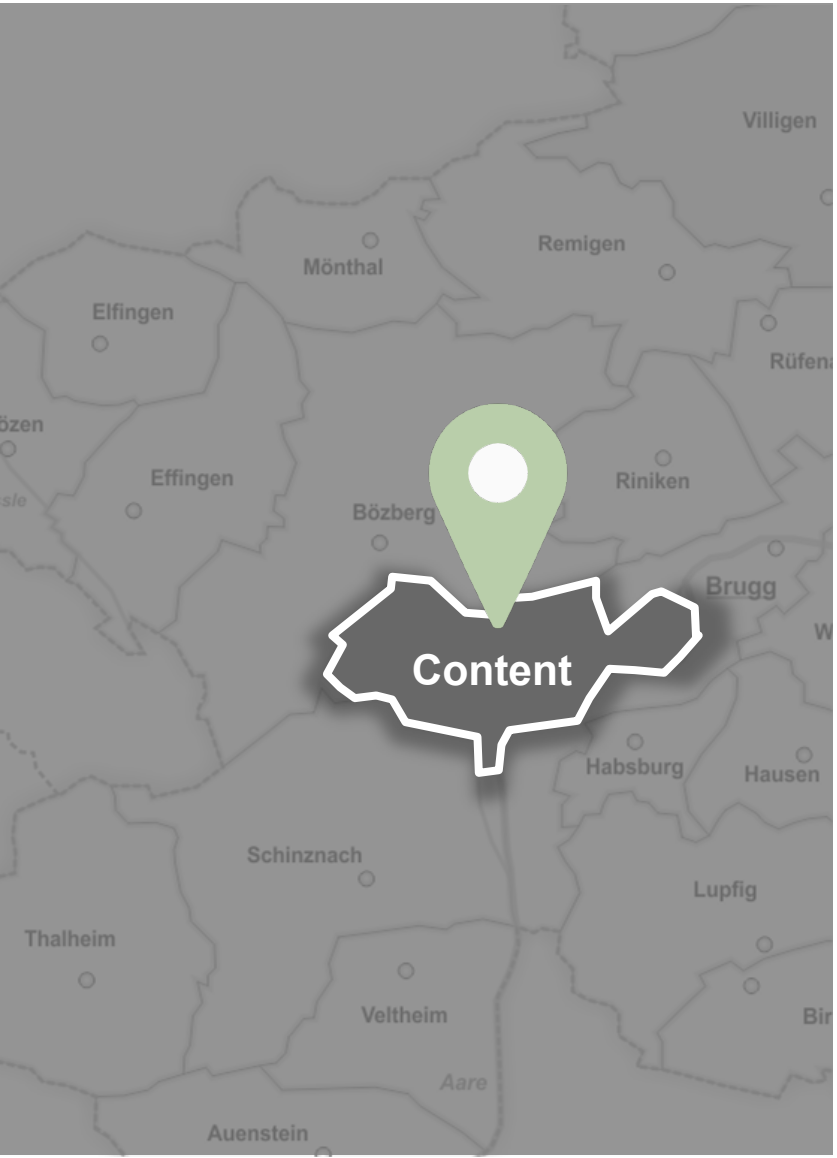
- Practical days on-site
- Some lecture days continue online
- Some lecture days on-site: split classes with broadcasting across rooms
- On-site standard hygiene measures apply + gloves due to many people handling same equipment

Conceptual Hotspots

Availability of the target group

- Traditional consecutive days vs. multiple short sessions
- Date/time flexibility
- Student access to quiet place
- Student access to appropriate equipment
- Consequences of extended time gaps between course portions
- Group vs. individual work

Conceptual Hotspots



Thematic interdependency of the modules

- Does material order matter
- Does timing matter
- Can modules be re-used

Criteria for self-guided learning units

- Suitability of the topic from a didactic point of view
- Frequency of potential reuse in other courses
- Effort for implementation

Design for reuse

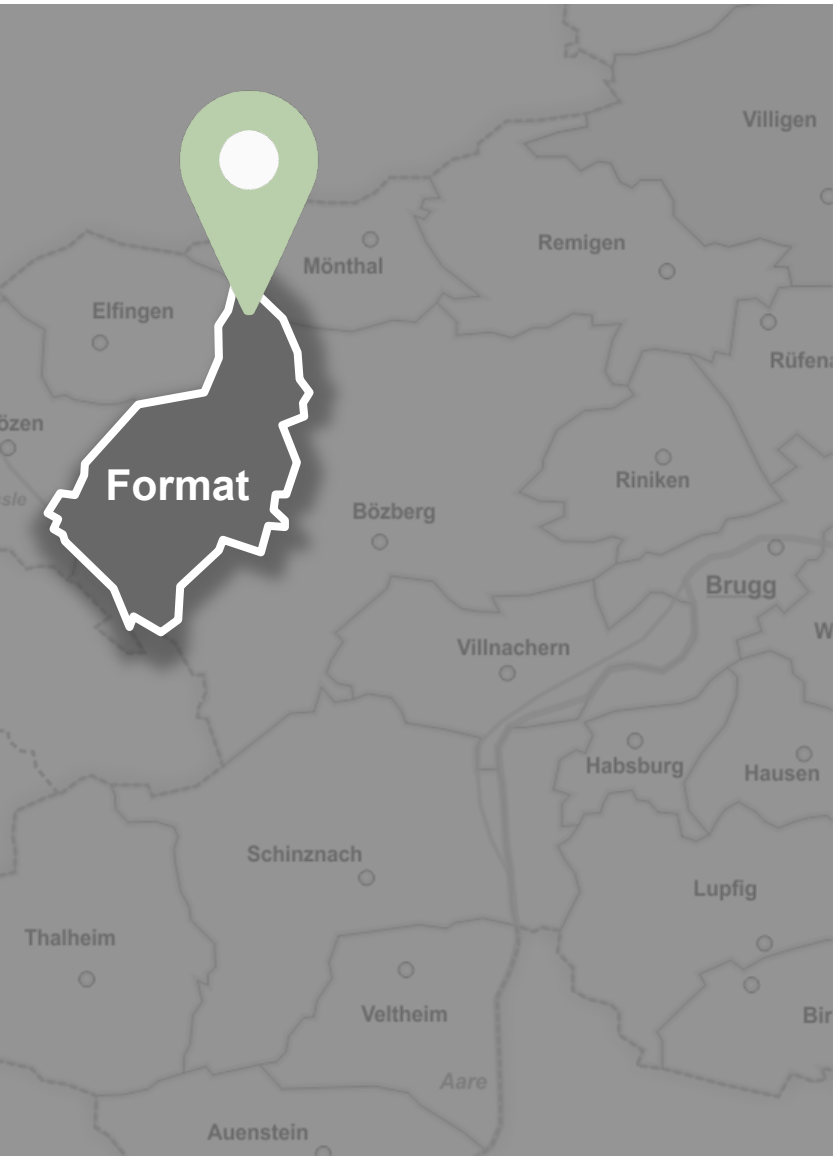
- Do not include course-specific information

Conceptual Hotspots

How to best integrate

- Questions
- Feedback
- Evaluation phases

Conceptual Hotspots



Some aspects for format choice

- **Didactic suitability** of the contents
- **Variety** for the students
- Availability of **technical resources** for the instructor/students and their ease of use
- Time and monetary **costs** for preparation (reusability products in other courses)
- **Organizational feasibility**

Our Concept Put into Practice

04.05.2020 / Morning		
08.30	-Welcome & introductions -Course organization -General instructions	Zoom w/PP
09.30	Fundamentals I	Self-study (Documents and exercises in Moodle)
10.30	Repetition	Zoom
11.00	Fundamentals II	Zoom w/PP
12.00	Lunch	

04.05.2020 / Afternoon		
13.00	Measurement techniques	Self-study (Documents and exercises in Moodle)
14.15	-Repetition -Practicals demo	Zoom w/PP
15.15	Practical radiation safety	Self-study (Documents and exercises in Moodle)
16.30	-Repetition - Q&A	Zoom
17.00	End	

05.05.2020 / Morning		
08.00	-Repetition -Q&A	Zoom
08.30	Radiation biology	Self-study (Documents in Moodle)
10.30	-Repetition -Q&A -Excercises	Zoom
11.00	Regulations	Zoom w/PP
12.00	Lunch	

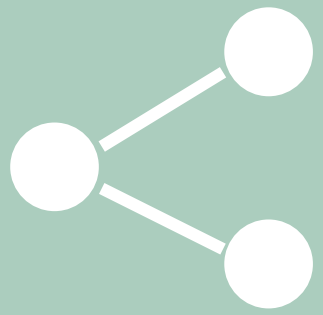
05.05.2020 / Afternoon		
13.00	-Repetition -Q&A	Zoom
14.00	Self-study	
15.00	Course review	Zoom, Findmind
15.30	Exam	Moodle
16.30	End	

Participant Feedback: What did you particularly like about this course? What should be changed about this course?

Lessons Learned

- Creating professional online content is a full-time job
- Make use of existing WBT (good for short / introductory courses & modules)
- Share handouts (PDFs) before the beginning of a class
- If more self-study is expected of students → customers request lower prices

Create & Share



Lessons Learned

Live Stream

Synchronous teaching/learning is possible online!

When livestreaming lectures in a traditional setting

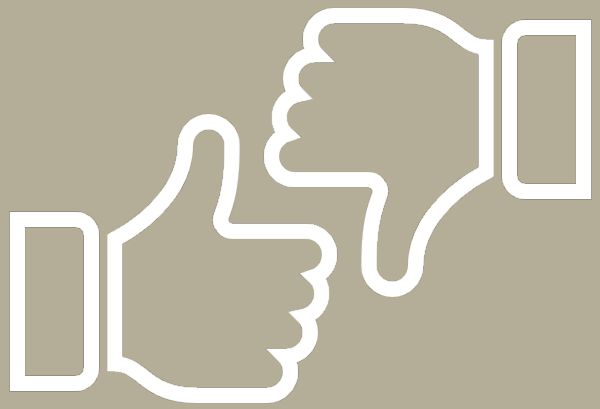
- Use a moveable camera
- Use a clip-on microphone
- Mark off «free movement» zone to stay within camera angle
- Make use of standard materials like flip charts, demos, your PP slides

Bring in some variety

Use interactive tools such as annotating onscreen, polls, breakout groups, etc.

Lessons Learned

Rules are important



Set ground rules!

- Send links early - allow students & guest lecturers time to familiarize themselves with the technical aspects of the platform
- Cameras on, audio off
- Take several short breaks instead of fewer longer ones
- Explain platform functions
- Use real / first names

Lessons Learned

Flipped Classroom

Students study/learn on their own and meet (virtually) to work through problems/examples rather than being fed theory

Advantages:

- more interactive screen time
- once initial (significant) effort is placed into creating content, students can be divided into smaller groups for on-site work (practical) while those not attending keep learning at their own pace

Think out of the box

Closing Pros and Cons of Online Classes

- Flip charts and white boards may be hard to share/see
- Reading the room can be difficult
- Students may be shy to engage/not feel comfortable with software & online etiquette
- Time will be “wasted” on technical difficulties
- Instructors & students may lack appropriate equipment
- Some real-time content must be integrated

do not rely 100% on self-guided learning

- Students need something physical to ground them
- Administrative support increases
- Some customers severely restricted the platforms their employees can access
  → instructors need to be flexible
- Convincing customers & regulators that material can be conveyed well & securely takes time

Closing Pros and Cons of Online Classes

students can join from anywhere = ↓ travel time/cost

Site-seeing "tours" improved!

- ✓Students had "access" to otherwise restricted areas
- ✓No time was wasted walking to and fro / dressing out
- ✓It's ALARA
- ✓Guides were better prepared
- ✓Saved time/money by combining virtual tours for multiple courses

↓ contact time = increased safety

Wir schaffen Wissen – heute für morgen

Teaching radiological safety online is possible

… know your audience
… put a lot of thought into the content and format of your course
… integrate at least some live time
… do not forget the invaluable experience of hands-on work

My thanks go to

- **Gerold Schmidt** our WBT guru and PowerPoint formatter extraordinaire
- Our **admin staff** who have been inundated with questions during uncertain times
- Our **external lecturers** who have gone outside their comfort zone while adapting to new tools
- **My team** of instructors:
  - **Barbara Roth**
  - **Peter Häberling**
  - **Ralph Hardegger**
  - **Lars Kämpfer**
  - **Dieter Mohr**