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PAPER

Balancing Theory, Practice, and Innovation: Requirements Engineering Curricula in Swiss Higher Education

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ABSTRACT

This qualitative study provides an in-depth overview of requirements engineering (RE) education in Swiss higher education institutions, comparing the offerings at universities and universities of applied sciences. The findings reveal major diversity in course formats, content, and institutional contexts, with a strong emphasis on industry relevance. Many programmes incorporate practical learning, project-based assessments, and alignment with professional standards like the Certificate of Professional Requirements Engineering of the International Requirements Engineering Board. While this research is specific to Switzerland, its insights have broader implications for RE education in Europe, particularly in dual higher education systems. The study highlights the growing importance of emerging themes such as artificial intelligence, stressing the need for curricula that remain responsive and future-oriented. To deepen understanding and strengthen the validity of findings, ongoing research will triangulate educator insights with student and industry perspectives, enabling a systematic comparison of needs, expectations, and perceived challenges in RE education. This triangulated approach will support the development of effective, inclusive, and practice-oriented RE curricula.

KEYWORDS

requirements engineering (RE), higher education, industry relevance, curriculum development, requirements engineering education (REE)

1 INTRODUCTION

Requirements engineering (RE) has evolved into a distinct discipline within software engineering (SE), providing a systematic and disciplined approach to specifying and managing requirements to understand stakeholder needs and reduce the risk of developing unsuitable systems [1].

Requirements engineering plays a unique role in engineering education, situated at the intersection of technical and social competencies. It requires soft skills in addition to theoretical and technical knowledge [2], [3]. The subject involves a diverse set

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of situationally selected methods, and much of the content is best learned through experience. This presents a dual challenge for educators: facilitating knowledge acquisition while simultaneously cultivating students' decision-making abilities and applied understanding. [4]. Addressing these needs requires a carefully structured curriculum that integrates both theoretical learning and practical application [5]. Thus, the distinction between RE education (REE) in higher education and continuing education is important. While students in university settings often lack practical experience and may underestimate the complexity of eliciting requirements, participants in continuing education typically bring problem awareness from their work environments. This affects how RE should be taught in each context, with higher education needing to first foster awareness of real-world challenges before building competence [6].

The present study examines how RE is taught in Switzerland, a country with a dual higher education system in which Universities of Applied Sciences (UAS) make up more than half of the institutions. In Switzerland, Austria, and Germany, UAS have experienced substantial growth, sometimes exceeding traditional universities in terms of student numbers and industry collaboration [7]–[9]. This highlights their growing role in engineering education, particularly in the German-speaking regions.

However, research on REE in UAS is limited [42]. This study addresses this gap by examining and comparing educational approaches to RE in UAS and universities. Switzerland's dual educational system, which combines vocational training with academic pathways [10], makes it an especially compelling case for studying REE in different types of institutions. The insights gained from this national case study can serve as valuable references for international educators and curriculum designers working in diverse, practice-oriented higher education systems, including broader fields of engineering education, where practical relevance is equally essential.

2 BACKGROUND

2.1 Switzerland's higher education system

Higher education institutions (HEIs) in Switzerland can be broadly categorised into two types, each with distinct educational goals: traditional universities (UNIs) and UAS [11]. While both types are recognised under Swiss law and award state-accredited degrees, they differ in their focus, structure, and educational grades. UNIs are comprehensive institutions that offer various academic disciplines, including law, economics, social sciences, medicine, natural sciences, humanities, and cultural studies. They are also authorised to award doctoral degrees (Ph.Ds.). In contrast, the UAS offer professionally oriented programmes in engineering, information technology, business, design, health, social work, and the arts, emphasising practical skills and alignment with industry needs. UAS degrees end at the master's level [11].

In Switzerland, Certificate of Advanced Studies (CAS) programmes play a significant role in continuous education, reflecting the country's strong focus on vocational training. CAS programmes are specialised postgraduate qualifications that offer practical knowledge and skills in specific fields. Designed for working professionals, CAS programmes help participants enhance their expertise, upskill, or stay updated with industry trends. They are typically modular, allowing flexibility to balance studies with full-time employment, and are shorter than full master's programmes, typically awarding 10–15 ECTS credits [12]. The primary target audience for CAS programmes include mid-career practitioners and individuals seeking career advancement or specialisation. CAS programmes are popular in fields in which continuous learning is essential, such as information technology, business, healthcare, and education. Offered by both UNIs and UAS, CAS programmes often serve as standalone certifications. However, they can be combined with other CAS or Diploma of Advanced Studies (DAS) programmes as part of a modular pathway toward a Master of Advanced Studies (MAS) degree. Table 1 summarises key types of continuing education programmes in Switzerland. This complementary higher education system enables participants to pursue academic qualifications alongside professional employment, effectively bridging the gap between education and the workforce [13]. Within this structure, the UAS plays a key role in fields such as RE, where applied science and practical skills are essential.

Table 1. Overview of CAS, DAS, and MAS programmes in Swiss continuing higher education

Programme	Description	Admission Criteria
CAS (Certificate of Advanced Studies)	Short continuing education programme focusing on specific professional skills.	Typically a tertiary-level qualification or equivalent professional experience.
DAS (Diploma of Advanced Studies)	Broader continuing education programme, often combining multiple CAS or extended content	Similar to CAS; more extensive prior experience or education may be required.
MAS (Master of Advanced Studies)	Modular continuing education degree, often built on CAS and/or DAS programmes.	Tertiary-level qualification plus professional experience.

2.2 Related work

The purpose of this study is to investigate RE curricula in higher education at the system level, paying particular attention to the intended target audience, the structural characteristics of course offerings, and the ways instructional approaches are embedded in these curricula. Existing research provides only partial answers to these questions.

Reviews of REE literature indicate that most contributions are single-course experience reports or solution proposals [2], [3], [14], usually focusing on innovative but isolated teaching ideas. REE publications are primarily descriptive and small-scale, with limited validation or evaluation, and only marginal reference to established frameworks or standards [3], [14]. Furthermore, the field remains fragmented and unsystematic, with RE topics often embedded under broader course labels such as SE or business analysis (BA) [14]. Reported challenges in teaching and learning recur across studies, including difficulties in linking theory and practice, as well as persistent gaps between academic instruction and industry expectations [15].

Only a few international studies have attempted to provide consolidated insights into multiple higher education settings. An investigation that analysed a random sample of 19 bachelor's degree programs in SE, computer science, and information technology in the UK, United States, Australia, Malaysia, and Canada identified several challenges in REE [16], including misalignment between academic teaching and industry needs, limited emphasis on communication and teamwork, and difficulties engaging students with real-world problems. The authors recommended more active, experiential strategies, such as simulations, role-playing, and project-based assignments, to bridge the gap between classroom learning and professional practice. An exploratory study of RE courses at major public universities in Malaysia [17] provided similar evidence from a student perspective. Many students perceived an overemphasis on theory at the expense of practical application, which led to difficulties in applying RE knowledge to real-world contexts. Nearly half reported never using RE tools during the course, and most expressed a desire for more hands-on exercises, industrial examples, and tool-supported work. The study concluded that current teaching approaches often fail to develop practice-oriented competencies and called for more student-centred pedagogies aligned with industry standards. A preliminary analysis of RE curricula in the United States [18] also investigated whether RE courses adequately address industry requirements. The results showed that more than half of SE bachelor's programs lacked a dedicated RE course, and where RE was included, the time allocation was minimal. Furthermore, the study found that course content frequently diverged from recognised frameworks, such as the ACM/IEEE guidelines, and that active learning methods were seldom employed. Several international studies demonstrate innovative yet largely isolated approaches to teaching RE. Most adopt project- or problem-based learning formats, frequently developed in collaboration with industry partners or using authentic case studies [19]–[22]. These efforts aim to increase student motivation and reduce the gap between classroom exercises and professional practice. Other contributions experiment with active learning formats, such as role-playing [23], [24], gamification [24], [25], case-based learning [26], or design-oriented methods [27]. A few studies propose structured curricula or align their course designs with established standards or domain-specific bodies of knowledge, for instance, by integrating formal methods into undergraduate RE courses [28] or adapting RE teaching to safety-critical and medical software contexts [29].

Assessment practices in REE research are underexplored. Available evidence comes from a few isolated studies, such as the use of scoring rubrics to evaluate RE students [30], calibrated peer reviews of RE assignments [31], or a gradeless, competency-based residency model in SE education [32]. While these initiatives point toward innovative directions, the evidence base remains fragmented and lacks a consolidated perspective on assessment strategies within RE curricula.

In summary, previous REE research has provided insights into instructional approaches, curricular content, and RE competencies. However, existing studies are predominantly small-scale and fragmented. Comprehensive, evidence-based analyses of REE across an entire national higher education system remain lacking, a gap this study seeks to fill.

2.3 Educational frameworks

Educators may seek help in developing an RE curriculum by drawing inspiration from a body of knowledge (BoK). A BoK is a comprehensive and organised collection of knowledge and skills essential for a particular profession or industry [3, 14]. It represents practitioners' expertise and experience in a field and is a reference point for the education, training, and certification of professionals. BoKs evolve continuously as new knowledge, technologies, and practices emerge in each field. They are developed and maintained by professional associations, industry groups, and academic institutions to ensure that professionals remain updated on the latest trends and advances in their fields. Since RE has evolved from software engineering, the Software Engineering Body of Knowledge (SWEBOK) [33], which includes a section on RE, may still be a valid reference. Several attempts have been made to develop a dedicated requirements engineering BoK, but these efforts have not resulted in a fully established framework. The only version published is the Japanese version, which may explain why it has not been widely adopted. Another noteworthy BoK that could serve as input for a vision of an RE curriculum is The Business Analysis Body of Knowledge (BABOK) Guide [34], as RE and BA overlap in many disciplines [35].

In the context of professional training, certification frameworks also play a crucial role. RE practitioners can benchmark their training against certifications issued by the International Requirements Engineering Board (IREB), a non-profit organisation dedicated to standardised certification programmes for RE [2]. The IREB was created in 2006. Since 2007, more than 88,000 professionals in 91 countries have passed the Certificate of Professional Requirements Engineering (CPRE) Foundation Level (FL) examination [36].

A standard is a technical specification approved by a recognised standardisation body to ensure an optimal degree of order within a given context. Within REE research, the identified standards [3], [14] primarily originate from the Institute of Electrical and Electronics Engineers (IEEE), such as IEEE Std 12207:2017 and IEEE 29148:2018 [37]. Integrating industry standards into education helps students to align their practical work with professional practices and familiarise them with industry best practices already in their education [38], [39].

Only about 24% of REE studies [14] explicitly reference an RE model curriculum, BoK, or standard. SWEBOK, the IEEE/ACM Computing Curriculum for Software Engineering (CCSE) [40], and various IEEE standards were the most frequently cited sources. In contrast, there is little evidence of the use of IREB certification syllabi in the reviewed studies, despite IREB being described as "the de facto standard for standardised RE education" [4].

3 METHODOLOGY

3.1 Research objective and design

Focusing on Switzerland, with its diverse HEIs and continuing education programmes, this study examines REE at a national and system-wide level. It addresses a critical gap in the understanding of REE in higher education (HE) by providing a comprehensive overview of current curricula, formats, and target audiences. To achieve this, a qualitative research design was employed. The study integrates data from publicly available course information with expert insights from interviews with educators involved in RE instruction or curriculum development at Swiss HEIs. Table 2 outlines the four research questions guiding this investigation.

Table 2. Research questions and methods

Research Questions (REQ)		Methods
REQ1	How are RE course curricula structured in higher education in Switzerland?	Qualitative content analysis of course descriptions, timetables, and schedules; Coding and thematic analysis of interview transcripts
REQ2	Who shaped or designed the RE curricula, and what motivated their decisions?	Coding and thematic analysis of interview transcripts
REQ3	How have educational standards or frameworks guided the design of the curriculum?	Coding and thematic analysis of interview transcripts
REQ4	What future adjustments to RE curricula do educators anticipate?	Coding and thematic analysis of interview transcripts

3.2 Data collection

An initial list of accredited HEIs in Switzerland was obtained from the Swiss universities homepage [9]. Switzerland's HE landscape includes 12 UNIs, 10 UAS, 19 teacher education universities, and 11 specialised institutions (e.g., theological or sports universities). Institutions unlikely to offer RE, such as teacher education universities and specialised institutions, were immediately excluded. The resulting pool included 19 institutions (nine universities, nine UAS, and one specialised institute) that could potentially offer RE-related courses.

Each institution's website was then systematically reviewed to identify RE courses, using both keyword searches (e.g., "Requirements Engineering") and manual checks of relevant degree programmes such as Informatics or Business Informatics. Course descriptions, curricula, syllabi, and timetables were analysed to determine the presence of RE content. A supplementary web search was conducted to capture additional offerings not visible on institutional websites. These materials were later complemented with documents obtained during the interviews, including screenshots and internal documents shared with interviewees' permission. The goal of the study was to capture all RE courses currently offered in Swiss HE and to obtain at least one interview participant for each course.

To ensure the completeness and quality of the data collection, two complementary measures were applied. First, the compiled institutional list was reviewed by a senior RE expert (former leader of the national RE research group and strong connections within the Swiss RE community). This validation refined the institutional scope, confirmed exclusions, and facilitated access by directly pointing to relevant educators. Second, snowball sampling [41] was used at the end of each interview. Participants were asked if they knew of other RE courses taught at their own institution or at other Swiss HEIs, and to identify the responsible educators. While no additional courses were identified through this procedure, it confirmed the completeness of the compiled list and further assured the study's coverage. Together, systematic search, expert validation, and snowball sampling provided triangulation, thereby improving the study's validity.

The semi-structured interview guide comprised 18 main questions across six thematic areas, including educators' backgrounds, curriculum design, instructional approaches, and assessment practices. All interviews were conducted online through Webex between May and October 2024, lasted 20–60 minutes, and were recorded and transcribed with the consent of the participants.

Once potential courses and responsible educators had been identified, either through institutional websites or through the recommendations of the RE expert, these individuals were contacted by email. In the initial message, participants were informed about the study's aim and invited to participate in an interview. Where information about a course was unclear, this was explicitly mentioned in the invitation, and participants were asked to verify or supplement the available details. At universities, the responsibility for RE courses typically remained with a single lecturer, most often a professor. Consequently, only this individual was interviewed for each course. In contrast, at UAS, the responsibility for course content and curriculum was usually shared across roles. As a result, more than one educator could be involved in curriculum design. In several cases, both a lecturer (l) and a programme leader (p) or module coordinator (m) were interviewed for the same course. In two cases, the programme leader also served as a lecturer in the course.

Despite the aim of interviewing at least one educator per identified course, this was not possible in three cases: (1) one university declined the interview request but provided course descriptions, (2) at one UAS the lecturer was also an author of this paper, so only a course description (authored by the module coordinator) was included, and (3) one university did not respond to repeated contact attempts. Table 3 provides an overview of the interviewees, indicating which roles were represented at UAS and UNIs.

Participants were assigned anonymised identifiers in the format Edu_[Type][Number][Role] (e.g., Edu_F8l), where Edu denotes an educator, F indicates a University of Applied Sciences (Fachhochschule), U a traditional university, the number reflects the recruitment order, and l, m, or s specify the role of the participant (lecturer, module coordinator, or (study) programme director). For instance, Edu_F1m refers to the module coordinator of UAS course 1, and Edu_U2l to the lecturer of UNI course 2.

Table 3. Overview of the interview and key codification

Type	Role	HEI Number							
		1	2	3	4	5	6	7	8
UAS	Module coordinator	✓					✓		
	Programme director	✓	✓			✓		✓	
	Lecturer	✓	✓	✓	✓	=	✓	=	✓
UNI	Lecturer	✓	✓	✓	✓	✓	✓	✓	✓

All participants were informed about the purpose of the study and gave their written consent before the interviews. The study received ethical approval from the Institutional Review Board of the affiliated university (Approval No. 17/2023, 14 October 2023).

3.3 Transcription and qualitative coding

A semiautomatic workflow was used for transcription and coding in MAXQDA. The recordings (24 videos and one audio file) were transcribed using the MAXQDA AI transcription service. Then, all transcripts were manually reviewed and refined. Quality control included random checks by a second researcher and participant approval (member checking). Coding followed a hybrid deductive–inductive strategy: an initial, interview-guide–driven codebook with memos was applied first, and additional codes/subcodes were iteratively added where warranted by the data. The MAXQDA AI Assistant then generated concise summaries of coded segments to refine these memos. In a second pass, the AI Coding Assistant was applied to suggest additional passages that matched the finalised memos. All AI suggestions were screened for acceptance or rejection, and, where necessary, memos or codes were adjusted. No AI output was imported without review. In effect, AI functioned as a second coder, but faster, helping to retrieve relevant segments that were occasionally missed on the first pass, without overturning existing human codes. The findings do not depend on AI-specific functionality. Equivalent results can be achieved through conventional manual procedures using the shared codebook, memos, and decision rules, and AI primarily reduces the time required for these tasks.

For example, the code memo “BA vs. RE” captured the views of educators about the relationship between BA and RE (whether differences are perceived and how they are articulated). Using this memo, the AI Coding Assistant identified a passage from Edu_U8l in which the interviewee described overlapping practices and concluded that "*all these terms … were more or less synonyms*." The suggestion was reviewed against the memo criteria and accepted as an instance of the "equivalence of BA and RE" theme, exemplifying how AI proposals were retained only when they clearly matched the memo definitions.

3.4 Declaration on generative AI usage

During the preparation of this work, the authors used ChatGPT-4o and Grammarly for grammar and spelling checks, as well as MAXQDA's AI-powered transcription service to transcribe the interviews. MAXQDA AI Assist was also employed to review the coding process. Subsequently, all content was reviewed and edited by the authors, who assume full responsibility for the final version of this publication.

4 RESULTS

In total, 18 HEIs, nine UNIs and nine UAS, were identified and contacted for this study. Within these institutions, 35 courses were analysed. These were dedicated RE courses or broader courses, primarily in SE, that included RE components. Importantly, the classification of a course as RE-related was based on confirmation by interview participants, such as lecturers, module coordinators, or programme leaders, rather than solely on course titles or descriptions available on institutional websites. Figure 1 shows the distribution of courses at HEI locations across Switzerland's language regions.

Although many courses were explicitly labelled as RE, several were formally framed as BA. Educators consistently described RE and BA as closely related and overlapping in content. As one lecturer explained, '*Requirements engineering is a subset of business analysis*' (Edu_F8s), while another noted, '*They are 80% congruent because they have to be able to do the same thing*' (Edu_F8l). BA was typically positioned to encompass broader activities, such as strategy analysis and stakeholder engagement, while RE remained central to both roles. The distinction between BA and RE also varied across sectors. For instance, RE is more dominant in technical domains like railway engineering, while BA is more common in banking or insurance (Edu_F8l).

This perspective aligns with evidence from the Swiss job market, where RE and BA frequently appear as overlapping or hybrid role titles, with some advertisements explicitly mentioning "Requirements Engineer" and others framed as "Business Analyst" or combined BA/RE positions [43]. A substantial overlap has also been reported in the literature, where both domains involve eliciting, analysing, and managing requirements. However, BA typically extends beyond these to include business strategy, process modelling, financial analysis, organisational design, and change management, with an emphasis on measurable business outcomes [35]. Systematic overviews of REE similarly note that RE topics are often taught under different labels, such as SE, Information Systems, or BA, which complicates the development of a consolidated perspective on RE curricula [3], [14]. Consequently, BA- or SE-labelled courses were included in the analysis if educators verified that they contained substantial RE content.

Enrolment numbers could not be obtained from central institutional statistics, as Swiss higher education institutions generally do not report student numbers at the granularity of single courses. Consequently, this study relied on estimates provided by educators, which nevertheless revealed consistent ranges across institution types. Across the CAS programmes, educators reported typical cohorts between 12 and 24 participants, with one course description explicitly setting a maximum of 24. At the UAS level, bachelor's courses ranged between 10 and 70 students, with most accounts indicating 20–40 as a manageable size. A UAS master's course was reported to have around 20 students. At universities, bachelor's and master's courses showed wider variation: elective courses typically enrolled 20–50 students, while compulsory courses ranged from 50 to more than 300 participants. Based on estimates from the educators interviewed, 800–1,600 students were enrolled in RE courses each year.

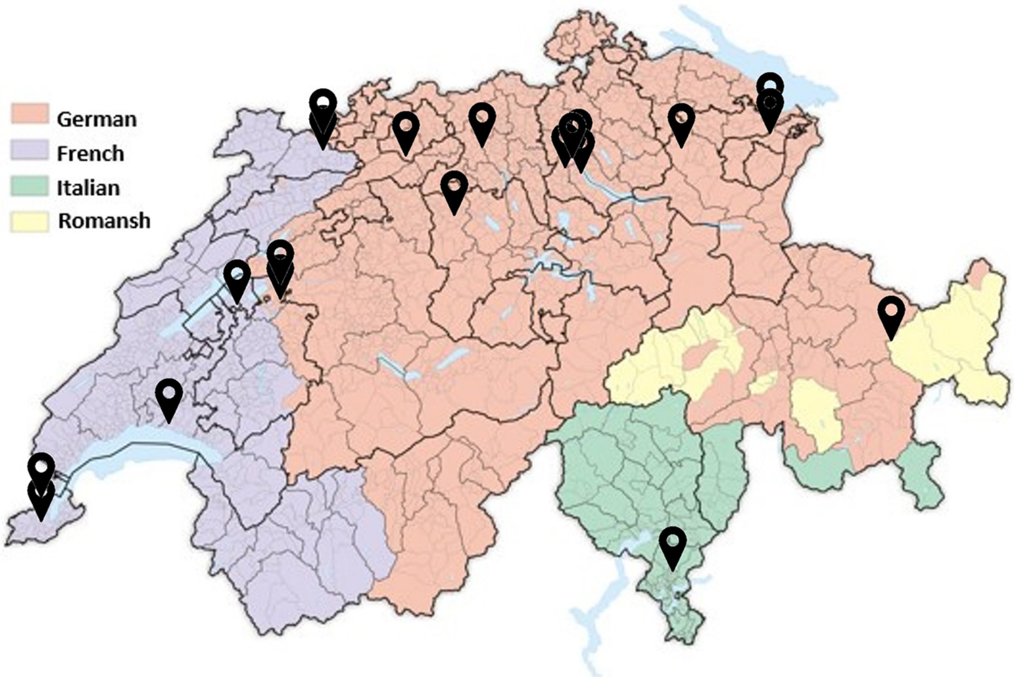

Fig. 1. Linguistic regions of Switzerland with HEI locations

Source: The base map was provided by the Federal Statistical Office: https://www.atlas.bfs.admin.ch/maps/13/fr/17138_17137_235_227/26599.html.

Table 4 summarises the distribution of identified course languages in HEIs in Switzerland. Nearly two-thirds of all courses (65%) were taught in German, reflecting the dominance of the German-speaking region within the Swiss higher education landscape. French was used in only three courses, while English was the language of instruction in ten (29%).

A clear institutional distinction emerges. UAS offerings are taught almost exclusively in the regional language of their location, predominantly German, with a single CAS course delivered in French. Only one UAS course was offered in English.

In contrast, UNIs exhibit a markedly international orientation: nine out of ten English-taught courses were offered by universities. This includes not only bachelor's and master's programmes but also the only English-taught CAS identified in the dataset.

No RE-related courses were found at UAS in the Italian-speaking region, whereas one university bachelor's course in Ticino was taught in English.

Overall, the data indicate a linguistic and institutional divide: UAS primarily serve a regional professional audience and therefore rely on local languages, whereas universities cater to a more international student body, particularly at the graduate level, where English predominates as the medium of instruction.

Table 4. Distribution of RE/RE-related course languages across Swiss HEIs

HEI Type	Language Region	Program Level # 35		Course Language
UNIs	German*	CAS	1	English (1)
		Bachelor	5	English (2), German (3)
		Bachelor/Master	1	(English)
		Master	2	English (2)
	French	CAS	/	/
		Bachelor	2	English (1), French (1)
		Master	1	English (1)
	Italian	CAS	/	/
		Bachelor	1	English (1)
		Master	/	/
UAS	German*	CAS	8	German (8)
		Bachelor	11	English (1), German (10)
		Master	2	German (2)
	French	CAS	1	French (1)

Note: * including Berne area.

4.1 RE course curricula (REQ1)

While language influences accessibility and reflects regional distinctions, understanding REE in Switzerland also involves examining whether RE is offered as a dedicated course or integrated into broader subjects, such as SE or project management (PM), the number of ECTS credits awarded, and the type of institution offering the course, whether at a UNI or a UAS.

Furthermore, the level of study (bachelor's, master's, or CAS), whether the course is elective or mandatory, delivery format (in-person, online, hybrid, or other), and course assessment all contribute to understanding the answer to **REQ1: How are RE course curricula structured in higher education in Switzerland?**

4.2 Course setting

In contrast to findings in the literature [17], where RE is mainly embedded in SE courses or is not taught explicitly, Swiss HEIs, particularly UAS, offer RE more frequently as a distinct subject. This discrepancy may be partly due to the underrepresentation of UAS in international REE studies [42]. To support this comparison,

Table 5 summarises how RE courses vary by type, credit allocation, and institutional emphasis. The tendency to offer RE as a dedicated subject is particularly pronounced at UAS, which offer more standalone RE courses and CAS programmes compared to UNIs. The study identified 10 dedicated RE courses and eight dedicated RE CAS programmes at the UAS. By contrast, at UNIs, only four dedicated RE courses were found, whereas most RE content appeared within the eight broader SE courses. The only CAS identified at a UNI was not RE-specific but integrated RE with topics in Artificial Intelligence (AI) and SE. The ECTS credits range from three to 6 ECTS for dedicated courses at UNIs and UAS, whereas SE courses with RE parts are generally higher at UNIs (five to nine ECTS) and lower at UAS (four to five ECTS). A special case are CAS courses which include several modules; therefore, the workload is also higher with 12–15 ECTS for dedicated RE CAS, just three ECTS for a CAS with RE parts at a UNI, and 10 ECTS for the only SE CAS with RE contents at a UAS.

Table 5. Overview of RE course types, ECTS and status in Swiss HEIs

HEI Type	Course Type	#	ECTS		Course Status	
			Min-Max	Median, Mean	Elective	Mandatory
UNIs	RE course	4	3–6	3.75, 4.13	2	2
	SE course with RE parts	8	5–9	6.00, 6.63	5	3
	CAS with RE part	1	3–3	3.00, 3.00	*	
UAS	RE course	10	3–6	5.00, 4.80	1	9
	SE course with RE parts	3	4–5	5.00, 4.67	2	1
	RE CAS	8	12–15	15.00, 13.87	*	
	CAS with RE parts	1	10–10	10.00, 10.00	*	

Note: *Courses within CAS are mandatory. Therefore, if students enrol, they must pass all the modules.

Of the 25 non-CAS courses, the majority (70%) were offered as part of a bachelor's degree programme, either at a UAS (n = 10) or a UNI (n = 7). Two UNI courses are open to students enrolled in either bachelor's or master's programmes. Only five courses are offered exclusively to master's students: two at UAS and three at UNIs. One of the UAS master's courses, a dedicated RE course, is provided through the collaboration of four UAS institutions.

At UNIs, five out of 12 RE-related courses are mandatory, while seven are elective. However, these electives are part of the 'Wahlpflichtfächer' system, which requires students to select courses from a predefined list. At UAS, RE appears to be even more important, with nine of 12 courses designated as mandatory and only three as elective. This distribution suggests that RE is considered a crucial skill, particularly in the UAS, where the focus on mandatory RE courses aligns with industry demands and expectations. This deduction was further emphasised by the seven dedicated RE CAS programmes identified. With costs ranging from CHF 7,700 to 9,980, these CAS programmes are sought out by working professionals and are sometimes even packaged as whole-company courses for their employees.

Teaching format. In addition to course content and institutional structure, the delivery format plays a crucial role in how students experience and engage with RE. Teaching methods vary between institutions, reflecting both pedagogical preferences and logistical constraints. Most RE courses were taught exclusively in person. Some educators noted pandemic-era experiments with online teaching, but in at least one case, this was deemed ineffective: *'The transfer of knowledge does not work'* (Edu_F6s). Four courses supplemented in-person teaching with online coaching, sometimes provided by teaching assistants. Some educators allow occasional online sessions—for instance, during the lecturer's physical absence—embracing post-pandemic flexibility. This flexibility was also reflected in two other courses, where lessons were taught in person but streamed and recorded in parallel, allowing students to choose whether to participate in person, watch the live stream, or view the recording later.

A UAS specialising in distance learning offers three blended learning courses, while a collaborative master's programme involving four UAS institutions integrates blended and hybrid elements. One CAS course alternates between fixed in-person and online instruction days, while the other features a hybrid-equipped classroom with live-streaming capabilities. To classify these varied delivery models, this study adopts current terminology that differentiates between blended, hybrid, and HyFlex formats. Blended learning combines classroom teaching with asynchronous online activities. Hybrid formats allow students to participate either in person or synchronously online. HyFlex courses offer the highest level of flexibility, enabling students to choose freely among in-person, synchronous online, or asynchronous participation without compromising learning outcomes [44]. Beyond these formats, six educators, including those at the distance learning UAS, reported using flipped classroom approaches. While some adopted it because of scheduling constraints, others continued to use it after positive experiences. One educator explained: *'Partly born out of necessity—because I might be at a conference or there is some other scheduling issue—I started using flipped classroom techniques. [...] Now I use it even when there is no immediate need because I have had good experiences with it'* (Edu_U6l). Students are expected to study materials in advance and bring questions to the class, fostering interactive sessions. However, several educators reported mixed results over time. One stated, *'We used quizzes and exercises in class, and it worked well for a couple of years. But recently, hardly anyone showed up for the practice sessions, and few watched the videos'* (Edu_U4l). Another educator shared that *'After some time, I felt the flipped classroom was ineffective, so I returned to traditional lectures—but then switched back again. It is a continuous cycle of trying what fits best'* (Edu_U5l). Table 6 summarises the distribution of these formats across the mapped courses.

Overall, the identified variations in teaching formats reflect constructivist learning principles, emphasising students' active engagement in constructing knowledge rather than passively receiving information.

Table 6. Delivery formats in RE courses

Course Format	#	Remarks
Traditional classroom	17	In-Person
Classroom +	4	Online coaching sessions
Hybrid	2	Partly in-person, partly online
HyFlex	5	
Blended learning	(3)	Overlaps with Flipped Classroom
Flipped Classroom	6	Self-study before class, in-person or online teaching

Course assessment. Closely tied to delivery methods is the way student learning is assessed. Assessment approaches often mirror overall instructional strategies, striking a balance between theory and practice. Therefore, most course assessments (over 80%) included a practical component, such as project work, group assignments, or hands-on tasks. Some courses rely entirely on practical assignments rather than written exams to evaluate student performance. This aligns with the recognition that RE is a discipline where most of the process is 'learning by doing' [3].

Only a few exceptions exist in which no practical components are involved. For instance, one UNI uses an oral exam, whereas the other incorporates group oral exams. However, in these cases, students complete a practical project during the semester, which is not included in the grading, but provides an opportunity to apply their skills.

A distinctive feature of a UAS is the inclusion of certification grades in its overall assessment. For example, in one course, 50% of the CPSA-FL certification grade achieved by the student is combined with 30% from a practical work grade and 20% from a short presentation. In another course, the same UAS integrated 20% of the CPRE-FL certification grade (IREB), 20% from a brief presentation, and 60% from a practical group work project completed during the semester.

Only two UNIs adhere to the 'traditional' approach, requiring students to pass exercises during the semester to qualify for a final written exam, constituting the entire grade. Another UNI has evolved this approach by introducing a semester-long project graded on a pass/fail basis, which determines eligibility for the final written exam at the end of the semester.

Such assessment practices align with experiential and competence-based learning theories, which emphasise the demonstration of applied skills and reflection-in-action rather than rote recall or theoretical examination.

Course content. The mapping of the course descriptions (see Figure 2), which was supplemented and verified through educator interviews, was based on a *flexible*, *extensible RE mapping scheme* (feREms), developed in a sub-study to ensure consistent categorisation of RE topics across institutions [46]. The resulting analysis shows that *Requirements Documentation* and *Elicitation* are the most frequently addressed topics. In contrast, *RE Process*, RE *Fundamentals*, and *RE Tools* appear less often. Particularly in courses where RE is embedded within broader SE or BA modules and not taught as a dedicated RE course, *RE Fundamentals* is usually not covered. This may be related to the underlying educational frameworks guiding the course design, which are discussed in Section 4.3. These courses tend to be less aligned with the IREB CPRE syllabus, which defines RE Fundamentals as a standalone Educational Unit [45] and covers the topic in substantially greater depth than a brief introductory explanation or definition. *RE Process,* which explains the selection of an appropriate RE approach, such as iterative vs. linear or prescriptive vs. explorative models, is only covered by two courses. CAS and UAS courses generally address a broader range of core topics, reflecting both their applied orientation and closer alignment with the IREB syllabus. Although assessments in many courses include project-based tasks that imply practical application, this is not consistently accompanied by the use of RE tools. While software implementation tools are commonly used in university courses, RE tools are rarely addressed. Only one dedicated RE course, aligned with the IREB syllabus, explicitly mentions *RE tools*—but focuses primarily on their intended purpose and capabilities, rather than offering hands-on experience.

RE Core Topics according to feREMs	UAS																UNI					
	CAS									B						M	B					B/M
	RE				Agile RE	BA	Agile BA	Agile BE	SE	SE		RE				RE	RE	SE		other		RE
RE Process														●								●
RE Fundamentals	●	●	●	●	●		●			●	●	●	●	●	●	●						●
Requirements Elicitation	●	●	●	●	●	●	●	●		●	●	●	●	●	●	●	●		●	●	●	●
Requirements Analysis	●	●	●	●		●	●	●	●		●	●	●	●			●	●		●	●	●
Requirements Documentation / Specification	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Requirements Management	●	●	●	●	●	●	●	●		●	●	●	●		●	●						●
Requirements Validation & Verification	●	●	●	●		●	●	●	●	●	●	●	●	●	●			●			●	●
RE Tools				●			●	●		●	●	●		●	●							●

Fig. 2. Extract from the RE topic mapping (n = 22), showing core topic coverage in selected Swiss HEI courses [46]

Note: Only courses that cover more than 2 Core RE Topics have been mapped.

Again, the connection to the IREB CPRE Syllabus might be the reason. The Educational Units on *RE Process* and *RE Tools* in the IREB syllabus mainly define learning objectives at Level 1 ("know") and Level 2 ("understand"). Level 3 ("apply") is only mentioned for *RE Process* in the context of simple applications and not at all for *RE Tools* [45]. This focus on lower cognitive levels reflects the design of the CPRE Foundation Level, which intentionally limits its learning objectives to Levels 1–3 of Bloom's Taxonomy. Only in the specialised Advanced Level (Practitioner) modules—such as *Modelling, Elicitation,* or *Management* does the IREB framework extend to higher-order objectives, including Level 4 (*analyse*) and Level 5 (*evaluate*) [53]. None of the interviewed educators indicated that their courses aimed to prepare students for these advanced practitioner certifications; instead, the Foundation Level syllabus was most cited as the reference point for defining course objectives. In addition, the limited use of RE tools in teaching may also be linked to practical barriers, such as the lack of educational licences or the comparatively high costs of professional RE software, which could discourage their adoption within higher education settings.

4.3 Designing the curriculum (REQ2)

How RE is taught, structured, and evaluated reflects deeper curricular decisions made by educators and programme leaders. To gain a deeper understanding of these decisions, the following section examines who is responsible for shaping the curriculum and the factors that influence its design. **To address REQ2: Who shaped or designed the RE curricula, and what motivated their decisions?**, the findings reveal the various roles, responsibilities, and motivations involved in designing and maintaining RE curricula for Swiss HEIs. The insights gained from the interviews highlight the contributions of programme directors, module coordinators, and lecturers, as well as the influence of institutional priorities and industry needs on the structure and content of RE courses. These roles and motivations provide a comprehensive understanding of the development and adaptation of the curriculum in practice.

Roles and responsibilities. Although the initial research design aimed to collect curriculum-related information solely through interviews with course lecturers, it became evident after the second interview with a lecturer from a UAS that additional roles were involved in the design and maintenance of the curriculum. These roles include programme directors (*Studiengangsleiter/innen*), module coordinators

(*Modulverantwortliche*), and, of course, the lecturers (*Dozenten/Dozentinnen*) themselves.

It is worth noting that, primarily at UAS, a distinction is typically made between permanent lecturers (usually holding the title of professor) with at least a 50% employment rate and those employed on a semester-by-semester basis, such as adjunct lecturers or guest lecturers, who generally have smaller teaching commitments. Adjunct lecturers are mostly employed simultaneously in industries and fields related to study programmes. This dual role ensures that teaching remains closely aligned with current industrial practices.

Programme directors are responsible for managing and developing academic programmes and ensuring their alignment with institutional and educational standards. Their responsibilities include designing, implementing, evaluating, and continually improving curricula. Additionally, they recruit and supervise teaching staff as well as administrative, scientific, and technical personnel. Beyond administrative tasks, programme directors may teach and engage in research activities, including initiating or leading projects. They work closely with institutional leadership and other programme directors to position their programmes effectively in the market using strategies such as public relations campaigns, online platforms, brochures, and informational events [47].

In the bachelor's and master's programmes at UAS, an official module coordinator is responsible for the course. *'Well, you are responsible for the curriculum, meaning the general definition of content and, to a more or less detailed extent, the module descriptions. And then, of course, there's the operational organisation, like finding lecturers if you're not teaching the course yourself. Essentially, during the semester, the operational tasks always aim to ensure that "classes take place". That's our definition, or rather my definition, of what a module coordinator is responsible for'* (Edu_F1m).

'...as a module coordinator I have different tasks like, for example, to keep the content of the module up to date. So, I could change it if I feel that the content doesn't fit anymore, that the trends in industry or the knowledge or the level of the students change, or if we find much better books or teaching materials. I'm free to change this. I'm also in charge of presenting the course to the students and publishing the grades. For this, I'm in charge of organising the teaching within the module because I co-teach this module with another colleague' (Edu_F2ml).

Similarly, in CAS programmes, this role is typically fulfilled by the programme director. These individuals usually design courses or CAS curricula in consultation with the lecturers. In most cases, the module coordinator teaches parts of the course or has done so in the past. For example: *'I don't teach in the CAS myself. However, what I do in the CAS is, of course, handle the welcome, farewell, and similar things, which are always nice. But I'm also involved in things like interim presentations and final presentations, as well as the so-called transfer projects. I participate in these presentations, assess them, and also evaluate the projects. I review the written work and provide the grading'* (Edu_F1s).

'I have been responsible for the CAS for several years. I have been teaching in the CAS from the beginning, and I took over responsibility for it in 2017. Since then, I have also restructured it in many areas to some extent' (Edu_F6s).

The university administration determines the overall structure of the bachelor's degree curriculum, specifically, which courses are mandatory and which are elective. However, the internal design of individual courses, including the instructional methods and content, is generally the lecturer's responsibility. This may involve developing the course curriculum from scratch or building on a predecessor's work.

Whether a course is taught in person, online, or in a hybrid format (e.g., streaming online while lecturing in class or alternating between online and in-person days) is determined mainly by the institutional strategy at UAS. These decisions are typically made at a higher level, such as by programme directors. By contrast, at UNIs, lecturers often have the autonomy to decide on the delivery format for their courses.

Motivation. The motivation behind curriculum design typically comes from two primary factors: industry relevance and market demand, as well as the lecturer's personal research interests. Industry relevance is a strong driver at UAS, while personal research interests also influence UNI curriculum design. This distinction affects whether there is a dedicated RE course or whether RE is integrated into a broader SE course. Lecturers and programme coordinators strive to align course content with industry needs to ensure its appeal and utility. One lecturer noted, *'I prefer to use what is standard practice in the industry in my training sessions'* (Edu_F8l1). Another commented, *'We primarily reference IREB. It is optional for the students to obtain the certification afterward. In this context, I already focused on IREB during the revision for the last semester to give them a fair chance. It is the industry standard'* (Edu_F4s). Edu_F4s explained: *'Whether we're talking about standards or best practices, there are, of course, certain baseline expectations nowadays for what is required of a requirements engineer. We naturally try to cover and incorporate these as best as possible. This is something we regularly discuss between us as colleagues, always asking the question: What do we need for practical application?'*

The common perception that universities are less practically oriented and primarily prepare students for academic research careers is incorrect. Edu_U8l, a lecturer of a master's course at a UNI, shared the following: *'The idea was to improve the success rate of students transitioning from [anonymised] to industry in their first few years. From my personal experience, I remember being completely lost in my initial years on the job because I had no business preparation of any sort. So, we wanted to give students a taste of industry before they graduate. We started this course as a way to show students what it will be like when they begin their careers.'*

Edu_U2l, a lecturer at a UNI, explained how the industry experience of technical staff can complement the sometimes-limited practical exposure of typical 'academic' university staff: *'Our TAs [Teaching Assistants] are mostly Ph.D. students who are required to teach, and many enjoy doing so. Also, our full-time engineers have to teach. These engineers often have a significantly stronger practical orientation than our TAs and, in some cases, even more than we do. This is very valuable. We had two engineers who were heavily involved in the original course development. This is immensely helpful because they bring real-world examples from their daily work into the classroom. One of the TAs teaching the technical part has extensive industry experience. He worked in the industry for about seven years before transitioning between academia and his Ph.D. work. His current work, which involves extensive collaboration with various stakeholders, makes him particularly valuable as a lecturer'* (Edu_U2l, Pos. 85).

At UNIs, particularly at the master's level, the curriculum often reflects the lecturer's research focus and academic expertise. As one lecturer explained, *'At the master's level, the curriculum is shaped by the lecturer's research interests, while at the bachelor's level, it is typically embedded within a broader software engineering curriculum'* (Edu_U1l). Another lecturer noted: *'The bachelor lectures were already predetermined when I arrived here because they were part of our bachelor programme, as required. It was clear that our group would handle software engineering. At the master's level, the focus was initially on topics relevant to our research, meaning that we offer education in areas where we are also conducting research. Beyond that, there were additional pragmatic limitations. We didn't need to offer more, so we left it at that for the time being'* (Edu_U6l, Pos. 52).

Two dedicated RE modules were initially introduced at one university, reflecting the research interests of the professor who designed and taught them. Following his retirement, the advanced module was discontinued, leaving only the foundational RE course in the curriculum. The retired professor continues to receive a teaching assignment for this course. He stated: *'… the question is whether it will actually remain so in the long run. But at the moment, the institute is still interested in continuing to offer this lecture as a teaching assignment.'* (Edu_U7l)

4.4 Educational Frameworks: Bodies of Knowledge (BoKs), Standards, and Certifications (REQ3)

Given the literature, the study examined whether and how Swiss educators draw inspiration from frameworks, bodies of knowledge, and industry certifications. This exploration informed **REQ3: 'How have educational standards or frameworks guided the design of the curriculum?'** The interview data provided insight into how these reference models are applied in real-world RE curriculum development across HEIs in Switzerland.

The curriculum design for RE and BA courses at the interviewed institutions was primarily guided by established industry standards—particularly IREB and BABOK—while other frameworks were mentioned less frequently, as summarised in Table 7. Multiple mentions were included, indicating that some educators were inspired by more than one framework.

The IREB CPRE Foundation Level [45] is a key reference point for RE components. Instructors use the recommended textbook *Basiswissen Requirements Engineering* (English: Requirements Engineering Fundamentals: A Study Guide for the Certified Professional for Requirements Engineering Exam—Foundation Level—IREB compliant) [48] as the core content, supplementing it with additional material and topics (e.g., agile practices, testing, and advanced modelling). Edu_F4s refers to the respective chapters in the official IREB certification book in his course blocks. In the past, some programmes offered students the opportunity to take the IREB certification exam immediately after completing the course at their HEI. However, this has become less common as some educators have noticed waning student interest. One educator explained, *'There were some who said they wanted to deepen the topic, they really wanted to get certified, but the demand for that has decreased'* (Edu_F3s). Another noted, *'We have noticed over the years that the students' interest in these certifications has declined'* (Edu_F3l).

For one course, the certification can even be integrated into the grading. As one educator explained: *'If someone does it, then it will also be honoured. But with a relatively small weight of 20%'* (Edu_F5s).

Although several educators rely on the IREB framework, not all are fully convinced of its merit. They use it primarily because it is what the industry expects for certification, and they aim to help students succeed in obtaining it. As one educator (Edu_F1l) explained: *'I'm quite familiar with IREB. I don't agree with everything, and I explain to the students why I don't agree. Especially when preparing for the exam, they have to answer in a certain way, even though we taught it differently. Unfortunately, that's just how it is, as it's dominated by academics. Some things may be theoretically correct, but practically they don't make sense.'*

In addition to the IREB CPRE and BABOK, some courses draw on other standards and bodies of knowledge, such as SWEBOK [33] and the HERMES project management methodology [49] used in Switzerland. However, these are typically supplementary, with IREB and BABOK serving as the central organising frameworks. Overall, the curricula emphasise a practical, industry-oriented focus that aligns closely with current market demands and expectations.

Triangulation of interview data with course descriptions and syllabi further confirmed a strong orientation toward established professional certification frameworks. Across institutions, the IREB CPRE Foundation Level was explicitly mentioned in nine cases, appearing in nearly all Universities of Applied Sciences (UAS) but only in one university (UNI). It was cited either within the course references or literature lists, included as a topic for certification preparation, or—in one instance—accounted for 20% of the final grade as part of the course assessment. Additionally, one CAS course referred to the CPRE RE@Agile Primer certificate, though not the Foundation Level. Other certifications appeared only sporadically, including ISAQB, Scrum Product Owner, and ECBA (the BA certificate from IIBA).

These findings suggest that, although various frameworks may have inspired educators when shaping course content, only those directly tied to formal industry certifications are referenced in official documents. Among these, the IREB CPRE Foundation Level clearly dominates as the primary curricular reference point across the institutions analysed. The reliance on professional frameworks such as IREB and BABOK underscores the relevance of professionalization theory in REE, where curricula are increasingly shaped by certification standards and industry expectations rather than solely by academic traditions. This shift reflects what has been described as *new professionalism*—a dynamic process in which professional roles and competences are continuously redefined at the intersection of academic knowledge and practical expertise [50].

Table 7. Educational frameworks influencing RE Curricula in Swiss higher education

Educational Framework	#	UNI	UAS
IREB	20	3	17
BABOK/IIBA	5	1	4
SWEBOK	1	1	/
HERMES	3	2	1
IPMA	2	/	2
SCRUM	2	/	2
Scaled Agile Framework (SaFe)	2	/	2
EduScrum	1	/	1
IEEE Standard (e.g., IEEE 29148)	2	1	1
ISO Standards (e.g., ISO n.d., 830)	2	2	/
Certified Professional for Software Architecture (CPSA)	1	/	1
ACM (Association for Computing Machinery) curriculum guidelines	2	1	1

Despite the widespread adoption of established frameworks, some educators expressed a need for more precise guidance on how to apply them meaningfully in curriculum design. One educator (Edu_U6l) remarked: *'What I find important... is the question of what perspective one takes to judge the importance of what we are teaching. From my point of view, what's missing is a clear guideline for what exactly we should be conveying to students, especially in times of technological upheaval, where so* *much is changing.'* While frameworks, standards, or model curricula offer structural support, they do not fully address how to determine relevance in a rapidly changing field. Edu_U6l also noted that many curricula rely heavily on individual judgment and advocated for more structured approaches and regular 'reality checks' through industry input to ensure alignment with professional practice.

4.5 Shaping the future of RE curricula in higher education (REQ4)

In response to REQ4—**What future adjustments to RE curricula do educators anticipate?**—the following section explores how educators believe RE will evolve considering technological and industrial developments, particularly the impact of AI and the shifting role of the requirements engineer.

AI as a game-changing agent. In response to what future adjustments educators foresee for RE curricula (REQ4), one educator emphatically stated: *'Obviously, it is AI!'* (Edu_U1l). Most of the educators interviewed (n = 19) underscored the importance of incorporating artificial intelligence (AI) into the RE curricula. AI has the potential to revolutionise various aspects of SE, including its offspring RE [51]. It reshapes the field by automating routine tasks, aiding in requirement generation, and enhancing validation and prioritisation processes. These developments highlight the need to adapt educational approaches to both SE and RE to equip students with the evolving demands of industry.

However, there is also some scepticism: Edu_F1l sees AI as a potential future trend but remains sceptical about integrating or applying it effectively in the context of RE, particularly in safety-critical systems. He expressed his concerns: *'This artificial intelligence hype, hysteria? I'm really curious to see how one can specify what is expected from such an AI system. I have no idea how to approach this. I mean, until we know how to handle all of this, we shouldn't use AI anywhere where human lives could be at risk'* (Edu_F1l).

Despite such reservations, AI is already making its way into REE in Switzerland: seven of the courses included in this study have incorporated AI for RE-related tasks, signalling a growing recognition of its relevance and the need to prepare students for its responsible use in practice. When reviewing the module descriptions and timetables to verify or triangulate educators' information on AI for Requirements Engineering (AI4RE), it became evident that not all materials were up to date. One educator explicitly noted that *'it might change what and to what extent we do AI4RE. We started by helping with phrasing requirements, but now we are experimenting with modelling'.* Among the few cases where AI4RE is mentioned in official descriptions, the references remain vague, for example: "Use of AI in RE across all phases", "AI in RE", or "Introduction to Generative AI, Prompt Engineering, and the Use of Generative AI for Requirements Engineering."

A reasonable conclusion is that, although educators expressed an intention to address or integrate AI4RE, it remains unclear to what extent and in which parts of the curriculum this integration should occur. The topic is in an exploratory phase, with institutions experimenting with various formats and levels of depth rather than adhering to a clearly defined curricular strategy. This stage of experimentation aligns with the diffusion of innovations theory [52], which posits that early adopters test emerging practices before institutional norms and shared standards become established.

Reimagining the role of the requirements engineer. Even educators who have already begun integrating AI into their courses, such as those using AI tools to draft requirements, acknowledged that further advancements and refinements are essential. They emphasised that AI will not replace requirements engineers but fundamentally reshape their roles.

Edu_F3s expressed uncertainty about whether the role of requirements engineers is simply changing or becoming more important, possibly making software engineers less central, while increasing the need for RE specialists. *'The more complex part, which is my research focus at the moment, is the role of the requirements engineer. Does it still exist with AI applications? Or is the data scientist the requirements engineer for AI applications? These are considerations, and for me, the educational question is: Yes, if the role still exists—and let's assume it does—what does AI contribute? Is it more about model validation, trustworthiness, or ensuring that everything the requirements engineer or data scientist does is compliant? I have many questions about where the role is headed (Edu_F4s).*

To remain relevant and effective, future requirement engineers must develop proficiency in leveraging AI tools and approaches as part of their professional practice. For example, Edu_F3s advocated teaching a more efficient but thoughtful use of AI tools in RE: *'Certainly, an exciting topic for the future will be artificial intelligence. Specifically, what tasks can AI take over in requirements engineering. For instance, can I have an outline for a requirements specification generated? Or how can I describe a persona with a specific perspective on an issue, which could help in preparing for an interview? This is an area where it will be important to carefully evaluate how much I can delegate to AI.'*

This view was supported by Edu_F4l, who emphasised the continued importance of RE in the future. He stated: *'I believe that requirements engineering will remain very, very important in the future. Even when attempting to automate certain parts of software development using AI, gathering requirements will likely remain a human task in the medium term. There is a lot of interpretive space, especially in how things are defined. However, processes will increasingly focus on reducing manual work and on incorporating more AI into software. That is why we need to focus on how to handle these transitions.'*

Edu_F4s emphasised the growing importance of AI in RE, noting that AI tools can significantly enhance the efficiency of certain tasks. However, he was also uncertain about how AI would impact the role of a requirement engineer, raising questions about whether the role would evolve or be replaced by data scientists working on AI applications. As he explained, *'With AI tools, certain tasks can indeed be done more efficiently. For example, writing a correct requirement, going through sentence templates instead of doing everything from scratch.'*

The growing importance of AI within RE could lead to a differentiation between classical RE and AI-supported RE, potentially resulting in course specialisation. As Edu_F4s contemplated: *'Of course, the topic of AI could expand. We might eventually come into conflict with traditional requirements engineering. Perhaps we would even need to separate it. But these are ongoing thoughts about whether we should actually create two or three modules on the topic.'*

5 DISCUSSION

The synthesis of data from the RE course descriptions and educator interviews provides a comprehensive overview of the RE educational landscape in Switzerland. RE is taught in various course formats, primarily as dedicated bachelor's courses and a wide range of specialised RE CAS programmes. When RE is taught as part of another subject, it is not only integrated into SE courses but also commonly combined with Project Management (PM) and BA, the latter of which some educators even consider a synonym for RE. In general, UAS are more likely to treat RE as a standalone subject, reflecting their close alignment with industry needs. Such responsiveness is particularly evident in CAS programmes, which are designed to attract professionals seeking up-to-date, practice-oriented training. At the master's level, courses are often shaped by lecturers' academic expertise, in line with a research-driven character of the curriculum.

Switzerland's RE curricula are predominantly influenced by the IREB CPRE syllabi and certification, with only a few exceptions where the BABOK was the primary influence. Common SE bodies of knowledge or standards, such as SWEBOK, ACM, or IEEE, are referenced by only a small number of educators and play a minor role in shaping RE curricula in Switzerland. This observation contrasts with the findings of international literature reviews [3], [14].

The emphasis on practical application is another distinctive feature of Swiss RE education. In contrast to previous studies that criticised excessive theoretical focus and a lack of real-world engagement [16], [17], [18], Swiss educators demonstrate a strong commitment to experiential learning. Project- and problem-based instruction dominate, often supported by guest lectures and case studies drawn from industry practice. Role-playing exercises occasionally simulate stakeholder communication, although other forms of "gamification" were not explicitly reported. These findings indicate that Swiss RE educators favour practice-oriented approaches, reflecting a deliberate yet cautious pedagogical stance.

Assessment practices further support this competence-based orientation. Across institutions, practical work, such as projects and applied assignments, typically accounts for a substantial part of course grading, while purely written or theoretical exams remain the exception. Although no novel assessment methods were identified, the preference for solid, practice-focused evaluation aligns with constructive alignment, ensuring coherence between teaching methods, learning outcomes, and assessment tasks.

Several educators expressed a clear need for guidance, particularly for new or rapidly evolving topics. Several educators expressed a clear need for guidance, particularly regarding new or rapidly evolving topics. Previous research had already highlighted this issue, pointing to a lack of orientation in structuring RE curricula [6]. Although that study predates AI as a major driver of change, the call for more guidance remains highly relevant, especially as educators face growing pressure to adapt RE teaching to technological and interdisciplinary developments.

The application of AI to SE and RE tasks has been a topic of interest in the RE community for some time, with the *AI in RE* workshop being organised annually at the IEEE RE Conference since 2014. Discussions at such venues, as well as in recent publications (e.g., [51], [54]), reflect a growing engagement among educators and practitioners with both the opportunities and risks of integrating AI into RE. This development aligns with broader trends in higher education research. Recent studies have documented a surge of interest in AI-enabled teaching, highlighting both enthusiasm and scepticism among educators [55], [56]. These works confirm that, while AI offers considerable potential to enhance efficiency, personalisation, and engagement, educators remain cautious about ethical implications, the potential erosion of critical thinking, and the readiness of institutions to support such transformation.

Despite its contributions, this study has several limitations. Although some information was triangulated with module descriptions and other institutional materials, many findings rely primarily on educators' accounts and may therefore reflect individual perceptions or biases. Such subjectivity is inherent in qualitative research but should be considered when interpreting the results. Furthermore, despite systematic searches and snowball sampling, some relevant courses may not have been captured. Finally, as the data were collected in 2024, the findings represent a snapshot in time and may not fully reflect ongoing developments in REE. Given the continuous evolution of higher education and rapid technological change, particularly in the context of AI, RE curricula are expected to continue evolving beyond this period.

6 CONCLUSION

This study provides a comprehensive overview of how RE is taught across Swiss higher education institutions, with particular attention paid to the differences between UNIs and UAS. The findings reveal that REE in Switzerland is diverse in terms of format, content, and institutional context. Industry relevance strongly shapes courses, with many programmes integrating practical components, project-based learning, and alignment with professional standards, such as the IREB CPRE.

Although this study is rooted in a specific national context, the insights derived are valuable beyond national borders. Switzerland's dual higher education system, characterised by both academic- and vocationally oriented institutions, mirrors similar structures in other European countries, particularly in German-speaking regions. The curricular strategies, challenges, and innovations identified here may inspire educators across Europe to reflect on how RE is taught within their systems.

At the same time, the study's limitations—particularly its reliance on educators' perspectives—highlight the need for broadening future research. Ongoing follow-up studies will address this by incorporating student voices and analysing industry job requirements. The student survey explores motivation, preparedness, and learning challenges across Swiss higher education institutions. At the same time, the industry analysis maps RE-related job profiles, required competencies, and expected educational degrees and certifications in the Swiss job market. Together, these complementary studies will enable triangulation between educator, student, and industry perspectives. Continued dialogue among educators, industry practitioners, and students remains essential to ensure that REE evolves alongside technological and professional developments.

7 ACKNOWLEDGEMENTS

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