Research-Informed Teaching Practice in Continuing Higher Education: Insights From a Swiss University of Applied Sciences

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Abstract

Continuing higher education helps individuals adapt to evolving professional demands. While aiming to provide practical benefits, it is equally defined by its scientific orientation. Swiss universities of applied sciences, which recently transitioned into higher education institutions, play a key role in this field. However, there is little empirical knowledge about how their teaching integrates research and science. This lack of evidence extends beyond Switzerland, representing a broader international research gap which this article aims to address through a descriptive and exploratory case study approach. In the absence of a validated measurement tool, a survey was developed, drawing on current literature about research-informed teaching. Data were collected from 150 lecturers teaching in continuing higher education at a Swiss business school. The responses were quantitatively analyzed to test three hypotheses. The most common form of establishing a scientific link in teaching is seen as the least laborious one and consists of referencing research results. Despite the short research tradition of universities of applied sciences, over 60 percent of lecturers incorporate multiple forms of research informed teaching in their classes. However, 12 percent establish no link to research and science and lecturers without a PhD are associated with fewer forms, highlighting room for improvement in fulfilling the institutional higher education profile. This article contributes to applied higher education research by providing a first empirical insight into how strong the profile-forming link between research, science, and teaching is in continuing higher education at non-traditional higher education institutions.

Keywords: research-informed teaching, non-traditional higher education, universities of applied sciences, continuing higher education, science oriented education

1. Introduction

Continuing higher education (CHE) plays a crucial role in enabling individuals to adapt to changing job markets, acquire new competencies, and pursue personal enrichment throughout their lives (UNESCO & Shanghai Open University, 2023). In Switzerland, CHE begins after students have obtained an initial higher education (HE) degree. Its programs are classified as non-formal education in the federal law on continuing education and intended for academically trained professionals in various fields. For admission, an HE degree and typically several years of relevant professional experience are required. Swiss CHE is therefore not intended as a way to make up for an HE degree; rather, its courses enable students to broaden and deepen work-relevant knowledge and to specialize professionally. Therefore, courses must be organized in such a way that there is a functional link between the student's prior learning and current needs regarding professional development and the research-based knowledge and competences taught at HEIs.

Swiss higher education (HE) operates as a binary system, comprising research universities (RU) on one side and non-traditional HE institutions (Trotter & Mitchell, 2018), such as universities of applied sciences (UAS) and universities of teacher education, on the other. All types of Swiss HEI offer CHE programs and those offered by UAS are characterized by growing demand. According to the Swiss Federal Statistical Office (FSO), the number of graduates of UAS provided CHE courses comprising at least 60 ECTS-points (Note 1), corresponding to the standardized degree of Master of Advanced Studies (MAS), rose by 25 percent from 2000 to 2023 (FSO, 2024a). Research universities (RU) award about 25 percent less MAS degrees than UAS (FSO, 2024b), while their number of bachelor's and master's graduates is about 70 percent higher. This indicates the importance of CHE for UAS.

Those focused on Business Administration, among them the business school of this case study, account for about 45 percent of the total income UAS generate from tuition fees in CHE (FSO, 2024c).

The case institution is a business school organized as a department of – in the Swiss context – medium sized UAS with about 8100 students outside of continuing education (FSO, 2024c). It occupies a leading position among Swiss HEIs in CHE. In 2022, 4999 people attended an MAS or one of the two other types of structured courses called Diploma of Advanced Studies (DAS) and Certificate of Advanced Studies (CAS) credited with at least 30 and 15 ECTS-points, respectively. Another 7725 attended a continuing education seminar or specialist course (Lucerne University of Applied Sciences and Arts, 2022) for which no ECTS-points are awarded and more relaxed admission requirements apply. The business school accounted for over half of the MAS, DAS or CAS course participants of the entire UAS (Lucerne University of Applied Sciences and Arts, 2022) and therefore has a particularly large responsibility when it comes to the further development and evaluation of its CHE programs.

In general, Swiss UAS and other HEIs have a strong economic incentive to provide good CHE programs. Since tuition fees are unsubsidized and have to cover costs, they are relatively high in comparison to what bachelor's or master's students have to pay for their studies. This prompts participants to look for a favorable cost-benefit relationship of their courses. At the same time, UAS are allowed to profit-maximize their CHE, unlike their master's and bachelor's programs.

Authors such as Tremp (2020) and Wilkesmann (2007) show that CHE must satisfy different rationales internationally. On the one hand, it must do justice to the reproduction pattern of science and, on the other hand, generate a practical benefit in the professional fields of its students. As stated by the overarching political body for HE in Switzerland (Swissuniversities, 2020), Swiss CHE considers itself part of the broader scientific system and characterized by an inquiring attitude and proximity to research while maintaining a strong orientation toward practice. Fischer (2014) cites the academic and research focus in particular as one of the profile-forming strengths of CHE at UAS. In contrast to continuing education offered by RU, where there is traditionally a strong link to research, the focus on science and research is a rather new task for UAS (Fischer, 2014). This type of HEI only began to be formed and tasked with a public research mission in the mid-1990s through the merger of post-secondary institutions primarily focused on practice-oriented teaching (Lepori, 2008).

Unlike in most European Countries and the United States, Swiss HEIs are largely responsible for fostering innovative approaches in teaching and learning themselves, as independent intermediaries or governmental agencies to support this are largely missing (Federkeil et al., 2023). For instance, several initiatives supported German HEIs in raising their profile through research-informed teaching in recent years and the need for its integration into the teaching profile of HEIs has been recognized (Huber, 2020). A number of European countries, such as the United Kingdom and Germany, have established national structures specifically dedicated to supporting learning and teaching in higher education (Zhang, 2022). While there is a growing international consensus on how science and research can be incorporated into teaching in higher education (Huber & Reinmann, 2019), there is currently no empirical evidence on the nature and extent of its implementation in Swiss CHE, particularly at UAS. The importance of the provision of CHE for UAS and the significance of these HEI in the further qualification of skilled labor for the Swiss economy stand in sharp contrast to this research gap. In order to address it, the following research question is investigated in this contribution:

How strong is the link between research and teaching in Swiss CHE provided by UAS?

In trying to find answers to this question, this research paper aims to make a contribution to applied HE research. It continues by outlining the theoretical framework of its investigation and three hypotheses. This is followed by explaining the methods and data used. Then the findings are presented and subsequently discussed. The last section addresses the limitations of the research and offers conclusions and implications.

2. Theoretical Framing and State of Research

In educational research and related fields, there is a growing common understanding of how science and research can be incorporated into teaching, but there is no standardized terminology to clearly define it (Huber & Reinmann, 2019). Tremp and Hildbrand (2012) previously pointed this out in the "Zurich Framework" dedicated to linking teaching and research in RU teaching.

Annala and Mäkinen, (2011) explain that in order to understand how the research link has been incorporated into curriculum development, it is helpful to distinguish whether students are seen as audience or participants and whether research is understood as content or process. Based on earlier work by Griffith (2004), Healey (2005) already laid down this principle in his research and distinguishes between four basic types of linking teaching and

research. The types referred to as "research-based" and "research-tutored" put students in the place of participants. While the former focuses on inquiry-based learning in general, the latter involves students in writing and discussing research. Teacher-focused curricula fall into the categories of "research-oriented" and "research-led" according to Healey. In their work for the British Higher Education Academy and University Alliance, Ansell and Marshall (2016) adopted Healey's (2005) types and summarized them under the term "research-informed teaching (RIT)". Ruess et al., (2016) confirm the conceptual systematization of Healey, Ansell and Marshall, and others by qualitatively analyzing study regulations and module descriptions from all 33 institutes at Humboldt University. Even though the three researchers use a more refined systematization of RIT than Healey (2005), they find empirical examples for all of his four types of linking teaching and research and are able to apply the distinction of students as an audience vs. students as participants in the context of German HE. Furthermore, Ruess et al., (2016) confirm the conceptual emphasis on research content and on research processes and problems in their study.

Huber and Reinmann (2019) have also developed a system for RIT in the context of German-speaking countries. It is strongly based on Healey and adds that there should actually also be "teaching-led research". This additional form of teaching-learning situation refers to a curriculum that is made up of activities that contribute to a research project at a HEI, with students acting as partners of researchers.

According to Ansell and Marshall (2016), research-led teaching is the least complex way in terms of organization and didactics to integrate science and research into teaching. It therefore seems plausible that it is most common in CHE provided by UAS. In addition, the practice-orientation of UAS and in particular business schools' state-formulated mission does not facilitate the inclusion of scientific elements in teaching methods. From this, the hypothesis (H1) that CHE's link to science and research at UAS is rather weak overall and is mainly achieved through so-called research-led teaching arises and is tested.

Swiss CHE is legally bound to be structured and offer the degrees of MAS, DAS and CAS linked to different levels of credits, i.e, the scope or a program. Since a larger scope offers more space for the inclusion of RIT and enables a more in-depth examination of problems and the discipline, it can be assumed that the link to research is stronger in more extensive CHE courses. This basic principle leads to the formulation of H2: The greater the scope of a CHE program in terms of ECTS-points, the stronger the link between research and teaching.

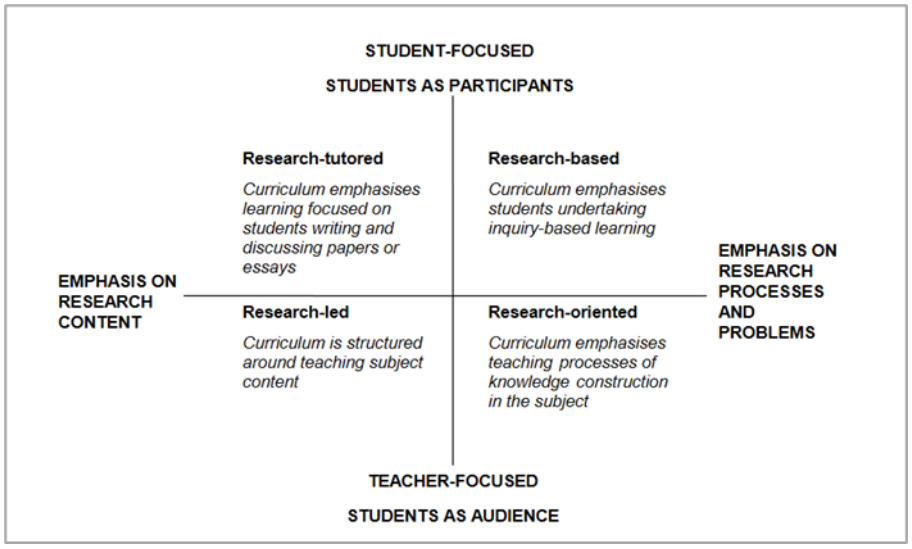

Figure 1. Types of RIT (Healey, 2005, p. 69)

A third hypothesis emerges from previous findings in the context of Swiss UAS. It has been shown that lecturers who are less likely to be motivated by research in their daily work have a greater probability for a weaker academic background than their colleagues with a strong motivation and are less likely to be familiar with current research findings in their disciple (Baumann, 2022). This observation corroborates Clark's (1997) statement that the doctoral level is where the imperative to engage in research becomes paramount and dominates academic activities most comprehensively. Therefore, the hypothesis (H3) that the link between research and teaching is stronger for lecturers

with a stronger academic background (doctoral degree and above) than for lecturers with weaker academic or UAS-background is tested.

3. Method and Data

The following research was conducted as a case study with a descriptive and exploratory character. While the aim of the study is to describe the phenomenon of RIT in Swiss HE through the case of a Swiss business school, it also tackles a problem "on which little or no previous research has been done" (Braun & Clarke, 2006, p. 43).

To collect the data, an online quantitative survey was conducted among lecturers, program directors and external lecturers who were involved in CHE programs at the case institution for at least eight contact hours per program. This threshold was defined by the governing body of CHE at the business school and intended to reduce the exposure to lecturers with a marginal teaching load, who do not significantly contribute to a program and whose contribution is therefore not expected to be meaningfully research-informed. The same body determined that neither the research based on the data collected with the survey, nor the survey itself required a review by an ethics committee because no personal information was collected, respondents were guaranteed anonymity and participation was entirely voluntary.

Since the quality and informative value of the data collected depends on accurate and easily understandable formulations of the various conceptual forms of the link between teaching and research, a thorough pre-test was carried out. Three lecturers and three heads of continuing education, of whom two from business schools different from the case institution, made themselves available as testers and provided feedback on the clarity and content of the questions.

The survey was intended to require as little time as possible from the participants in order to minimize the dropout rate. The expected short duration of a participation was emphasized in the communication for the survey and later confirmed. The average time required to complete the questionnaire was 8.5 minutes. Lecturers were able to answer closed questions on the link of their teaching in the various CHE programs anonymously. In the case of program directors, information on the conceptual link between teaching and research was also collected.

As there are currently no validated survey instruments on the link between research and teaching, items were developed as part of the project on the basis of literature and complemented with contextual questions. Essentially, this resulted in the statements shown in Table 1 regarding the different forms of RIT whose applicability could be confirmed or declined by the participants for their teaching engagements in the programs they are active. Respondents were also asked to provide information on their educational background, employment situation, and attitude regarding the importance of RIT in their teaching and at different types of HEI.

The items capturing the different forms of RIT were developed on the basis of Healey's (2005) categorization of RIT and the subsequent publication as ideal types by The Higher Education Academy (Ansell & Marshall, 2016). This framework has already been in use as an audit tool to support "research intensive education" in the Netherlands (Elsen et al., 2009) and has been widely discussed in HE and educational research. The formulation of the items shown in Table 1 are based on the descriptions of the different forms of RIT in Kossek (2009). Due to the conceptual overlap of research-tutored and research-based teaching and consequently difficult separation of the two forms of RIT in practice, they were combined in one item. Additionally, an item on "teaching-led research" as suggested by Huber and Reinmann (2019) was formulated and included in the survey.

Table 1. Items and corresponding forms of RIT

Item	Form of RIT	Focus and emphasis
I actively involve CHE participants in research projects in which they act as active partners of teachers/researchers and achieve research results together with them.	Teaching-led research	Students, research processes and problems
I support and instruct research activities by CHE participants, for example by guided discussion of written and oral work by continuing education participants or by coaching (group) work.	Research-tutored and research-based teaching	Students, research processes, problems and content
I convey established research methods, forms of knowledge construction and scientific attitudes that are used by me and/or other representatives of my discipline.	Research-oriented teaching	Teacher, research processes
I convey research results and content that I myself have been involved in producing or which are of significance for my specialist area.	Research-led teaching	Teacher, research content
I make no reference to science and research in my teaching.	-	-
I establish the scientific and research reference in a different way, namely as follows:_____	-	-

4. Results

4.1 Sample Description

A total of 412 people were invited by email to take part in the survey. From mid-March to mid-April 2024, 153 people responded to this invitation. This corresponds to a response rate of 37.14 percent. It is difficult to assess this. The median response rate for surveys on offline phenomena in education is 41.9 percent in peer-reviewed publications on research (Wu et al., 2022). Age and non-student participants are factors that tend to have a dampening effect on the response rate of such online surveys (Wu et al., 2022), which could explain why the measured response rate is slightly lower than the median rate reported in international research.

Due to the largely unknown population of lecturers in CHE, valid statements regarding the representativeness of the sample are difficult to make. A comparison of the highest qualifications between the survey participants in this study (see Table 2) and those in the 2018 nationwide survey of lecturers at UAS and universities of teacher education (Böckelmann et al., 2019) shows that the proportions for bachelor's degrees from RU and UAS, master's degrees from UAS, and postdoctoral lecturers correspond well (+/- 1 percentage point). However, RU master's degrees and professional qualifications are less frequently represented in this contribution's data than in the survey of 2018. The proportions are lower by around a third and a half, respectively. By contrast, the sample for this study includes around 20 percent more doctoral graduates than the sample of the earlier survey. Overall, the participants in this study's survey are therefore somewhat better qualified than the average lecturer at a Swiss UAS. Whether this is due to a selection bias or a general transformation of the body of lecturers cannot be determined with certainty. As shown in Table 2, doctorates and master's degrees from research universities dominate as highest degrees in the sample. Degrees from UAS are rather rare and only 11.8 percent report one.

Table 2. Frequency of highest degrees in sample

Highest Degree	N	Percent
Vocational degree	1	0.7
Higher Vocational degree	5	3.2
Bachelor's UAS	5	3.2
Bachelor's RU	3	2.0
Master's UAS	13	8.5
Master's RU	42	27.5
PhD	79	51.6
Habilitation	4	2.6
Other highest degree	1	0.7
Total	153	100.0

60.8 percent of the lecturers in the sample are only teaching, while the remainder also fulfill a role as heads or vice-heads of their programs. The lecturers are most often active in only one CHE program. As Table 3 shows, only a small percentage work in five or six programs. On average, lecturers work in 2.3 programs (standard deviation = 1.6). In most cases, the respondents work in programs for which ECTS-points are awarded. People with five or six programs are more likely to work in programs without ECTS than lecturers who teach in fewer programs.

Table 3. Frequency of the number of programs per lecturer and the corresponding share without ECTS-points

Number of programs per lecturer	N	Percent	Share of lecturers in programs without ECTS Percent
1	66	43.1	15.2
2	31	20.3	6.5
3	22	14.4	4.5
4	15	9.8	6.7
5	9	5.9	22.2
6	10	6.5	20.0
Total	153	100.0	

4.2 Statistical Analysis

Table 4 summarizes the results regarding the number of different forms of RIT used by the lecturers in the sample. Only just under 20 percent of lecturers do not make any reference to research in at least one CHE program they are teaching in. However, as shown below in Table 6, the proportion of lecturers who never make any reference to science and research is smaller. As shown in Table 4 the respondents most frequently communicate research results through research-led teaching, followed by support for student work and the teaching of methods through research-tutored or -based forms of teaching. Just over 11 percent achieve joint research results with their CHE students.

Table 4. Used forms of RIT

Type of RIT	N	Percent
Teaching-led research	17	11.1
Research-tutored and research-based teaching	84	54.9
Research-oriented teaching	71	46.4
Research-led teaching	107	69.9
No link to research	30	19.6
Other link to research	3	1.3

Note: column total >100 %, since lecturers can teach in more than one program or can use more than one form of RIT per program

The results in Table 4 suggest that H1cannot be rejected, i.e, research-led teaching consisting of didactic settings with students in the role of the audience and lecturers conveying relevant research results, is the most widely used form of RIT.

Given the high proportion of lecturers conveying research results and methods in at least one of their teaching engagements in CHE, it is interesting to look at whether these have been generated and used in the lecturers' own research activities. Table 5 provides an overview regarding this. At least occasionally, 62.7 percent of lecturers communicate their own research results. In comparison, a slightly higher proportion (71.9 %) shares methods they personally use with the same frequency. Around a quarter of each group of lecturers who communicate research results or methods never do so with their own research results or methods. For 32.2 percent of the first group this applies because they are not active researchers, while this is also the case for 23.4 percent of the second group. However, for most, the reason remains unknown as it was not surveyed. There is a statistically significant relation between the fact that lecturers use their own research results and methods in RIT and the frequency of the different categorial answers shown in Table 5 ($Chi^2(5) = 18.470$, $p = 0.002$). However, as the effect sizes (Cramer's $V = 0.16$, $CC = 0.36$) indicate, the association is weak to medium (Cohen, 1992).

Table 5. Frequencies of RIT with own research results and methods used by lecturers

	Research results		Research methods	
	Percent	N	Percent	N
Yes, frequently.	17.8	19	45.1	32
Yes, occasionally.	44.9	48	26.8	19
Yes, rarely.	11.2	12	4.2	3
No, I am not an active researcher.	8.4	9	5.6	4
No, my research takes place in a different context than my teaching.	0.9	1	0.0	0
No, for another reason.	16.8	18	18.3	13

Lecturers often use more than one form of RIT in their overall teaching activities in CHE programs, as Table 6 reveals. While 12 percent of lecturers never incorporate a link to science and research in their teaching, 27.3 percent restrict themselves to using only one form. In contrast, an equal number of lecturers have adopted two and three forms of RIT, respectively.

Table 6. Number of forms of RIT in lecturers' overall teaching activities

Number of forms of RIT	N	Percent
0	18	12.0
1	41	27.3
2	41	27.3
3	41	27.3
4	9	6.0
Total	150	100.0

There is a positive linear correlation between the number of forms of RIT that lecturers employ in all of their teaching and the number of CHE programs in which they teach ($r = 0.253$, $p = 0.002$, $n = 148$). However, the correlation is rather weak ($r^2 = 0.064$) because many lecturers establish more than one form of RIT per CHE program.

The results in Table 6, combined with the information on which lecturers teach in programs awarding ECTS-points and their educational background, allow for testing hypotheses H2 and H3, respectively. In order to test H2, the mean number of RIT forms lecturers establish in their teaching are compared between the programs with ECTS-points and those without. Since a Kolmogorov-Smirnov-Test ($p < 0.001$, $n = 150$) reveals that the number of RIT forms deviate significantly from a normal distribution, an non-parametric Mann-Whitney-U-Test is used. Lecturers that teach in programs with ECTS-points establish a higher median number of forms of RIT in their teaching (Mdn = 2, n = 129) than the comparatively small group of lecturers that teach in programs without ECTS-points (Mdn = 1, n = 21). However, the difference is not statistically significant ($U = 1162.500$, $p = 0.283$.). Therefore, H2 is rejected as there is not enough evidence that lecturers incorporate significantly more forms of RIT in larger programs that award ECTS-points than in smaller programs without ECTS.

A Chi ²test and a simple t-test are used to test H3. While the result of the former suggests a statistical relationship between whether a lecturer has at least a PhD and the number of forms of RIT employed in teaching (Chi ²(4) = 13.504, $p = 0.008$), the latter shows that the means differ between the two groups of lecturers. Holders of PhDs and habilitations establish on average 2.1 forms of RIT in their teaching (standard deviation = 1.1). For the other lecturers this number is 1.6 (standard deviation = 1.0). For the Chi^2-Test, the contingency coefficient of 0.287 ($p = 0.008$) and Cramer's V of 0.300 ($p = 0.008$) indicate a medium to strong association, while the correlation coefficient of the t-test is $r = 0.266$, which approximates a medium effect according to Cohen (1992). Therefore, H3 is not rejected.

5. Discussion

The majority of lecturers in CHE offered by the examined business school teach in more than one program. This enables many to vary their didactic choices and incorporate a form of RIT suitable to the programs and their learning objectives. While almost 20 percent of the lecturers teach in programs in which they do not establish any connection to science and research, only about 12 percent of the lecturers in CHE never create a connection to science and research in their teaching. It can be argued that in the understanding of Swiss CHE, the teaching of these lecturers does not contribute to the profile of a UAS. The HEI's management have to pay attention to this figure in order to guarantee a meaningful differentiation between its CHE are more practice-oriented continuing education outside of HE. The rejection of H2 suggests that a focus solely on smaller, non-ECTS awarding programs is statistically not justified in this monitoring activity. However, the clear difference in the median number of forms of RIT between the two types of programs also indicates that more data and research is needed to confirm that there is no significant association between the size of a CHE program and its link to research in teaching.

The most frequently cited form of RIT essentially consists of conveying research results. Organizationally and didactically, this is the least laborious way of integrating a link to research into teaching. However, it also represents a rather weak link. The fact that teaching research methods and related aspects is over 23 percentage points less common suggests that many CHE students are never exposed to research and science beyond a look at research findings. A quarter of the lecturers in the sample never convey their own research results, which is partially due to the fact that a third of these lecturers are not active in research. In comparison, of those lectures never teaching

methods they use themselves, only about a quarter do so because they are not active researchers. The two results can be interpreted as an indication that lecturers teach across sub-disciplines and impart methods that can be applied in different fields of research, but do not necessarily conduct research in the field in which they teach.

The findings suggest that overall, the intensity of RIT is stronger for lecturers with a strong academic background. This can be explained through the commonly held expectation that PhDs possess the skills to conduct independent research, while this is not necessarily the case for holders of master's or lower academic degrees (Paris Conference of European Ministers for Higher Education, 2018). Even though Swiss UAS do not have the right to award PhDs (State Secretariat for Education, Research and Innovation, 2023), they seem to rely heavily on lecturers with a doctorate to establish strong forms of RIT. Since UAS need to balance practice-orientation and academic-orientation through their teaching staff, this finding indicates that this type of non-traditional HEI needs to support lectures with less academic backgrounds, but valuable practice-orientation, in establishing stronger links between their teaching in CHE and research and science.

6. Limitations and Future Research

Being limited to lecturers at a single non-traditional HEI, the sample of this study does not allow for generalizations of the findings without careful considerations. Another potential limitation is the well-known tendency for self-enhancement in surveys (John & Robins, 1994).

Beyond research that confirms or refutes the findings of this case study within a broader disciplinary HE context, future studies could explore specific didactic choices associated with different forms of RIT. Additionally, gaining deeper insights into the reasons for referencing one's own research results and methods could further illuminate the individual teaching-research nexus in CHE.

7. Conclusion

This article provides a first insight into how strong the profile-forming link between research, science and teaching is in CHE programs at Swiss UAS. While this type of HEI only has a short research tradition in Switzerland, the findings suggest that the intensity and variety of RIT is good. The fact that over 60 percent of lecturers establish more than one form of RIT in their teaching in CHE and that conveying own research results and methods are quite widespread are indications that the connection to science and research is quite well developed.

Only 12 percent of lecturers report that they never use any form of RIT. While this does not seem to be statistically associated with the size of CHE programs, HE management should be aware of the fact that a small but not insignificant portion of lecturers is not conforming to the profile of their HEI. Since lecturers with a degree below a PhD are associated with lower numbers of forms of RIT in CHE, HE management could design and implement support measures for this group of teaching staff. In principle, didactic development courses and the provision of illustrative examples and teaching aids for lecturers could be considered. In addition and given the rather short research tradition of Swiss UAS, more detailed guidelines on how to structure the teaching may offer significant potential to enhance RIT overall.

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The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

Data sharing statement

No additional data are available.

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Note

Note 1. One ECTS-point equals about 25 to 30 hours of student activities and 60 ECTS-points represent the student activities of a full academic year (European Union, 2015).