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Article

Higher Education Institutions on Facebook, Instagram, and Twitter: Comparing Swiss Universities' Social Media Communication

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Abstract
Public communication has become more important to higher education institutions (HEIs), with many HEIs using social media to communicate with stakeholders. However, scholarship on the subject is scarce and mainly based on single-platform studies and small datasets. Therefore, we conducted a cross-platform study to examine the communication of all Swiss HEIs on Facebook, Instagram, and Twitter. The results were based on two datasets: an automated analysis on data for all Swiss HEIs (n = 42) and their social media accounts from 2004 to 2021 (337,232 posts from 207 accounts), and a manual content analysis on 1,500 posts per platform. By including all HEIs in one country, this study allowed for a comparison of the results by HEI type: universities of applied sciences, universities of teacher education, and research universities. Results show that, in recent years, HEI communication increased on Instagram, but not on Facebook or Twitter. Twitter was used the most by research universities, while most Instagram and Facebook posts were from universities of applied sciences. Universities of teacher education were least active across all platforms. The content of communication across all HEI types was primarily self-referential. Our analysis of how well HEIs used the affordances of social media communication relative to hypertextuality and multimodality revealed a generally high level of adaption. Moreover, our data showed no substantial impact of the Covid-19 pandemic on posting activities and engagement with social media posts by HEIs for the two first years of the pandemic.

Keywords
higher education institutions; new media technology; public relations; social media; strategic communication; Switzerland; university communication

Issue
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1. Introduction

As actors, topics, and platforms for science communication are diversifying (Swiss Academies of Arts and Sciences, 2021), higher education institutions (HEIs) are challenged to remain important voices in public debates (Entradas & Bauer, 2022). As a result, strategic communication is becoming increasingly important for HEIs (Scheu & Blöbaum, 2019). Although scholarly interest in the public relations efforts of HEIs is on the rise (VanDyke & Lee, 2020), particularly with respect to social media communication, scholarship shows three main shortcomings. First, most studies on the social media communication of HEIs have not accounted systematically for different types of HEIs. Moreover, many focused on high-ranked, elite research universities and often assumed that developments occurred across all HEI types (e.g., Bonilla et al., 2022; Fähnrich et al., 2020). Second, scholarship mainly consists of single-platform studies (e.g., Peruta & Shields, 2018; Stuart et al., 2017), overlooking that most HEIs operate on several platforms. Third, studies investigating developments over time are almost absent. The current study was designed to address these gaps through

a nationwide, cross-platform study encompassing the three most prominent social media platforms: Facebook, Instagram, and Twitter. We analyzed a complete dataset representing all Swiss HEIs (n = 42) for 18 consecutive years (2004–2021), including research universities, universities of applied sciences, and universities of teacher education (sometimes also called colleges of education), thus enabling us to compare different types of HEIs. The study focused on the adoption of social media by Swiss HEIs, their use of social media, and user engagement with their content, as well as on the characteristics, topics, and stakeholders mentioned in social media content by Swiss HEIs.

2. Literature Review

Research on HEI communication has gained momentum in recent years (Schäfer & Fähnrich, 2020; VanDyke & Lee, 2020). Such investigations shed light on the changing structures and practices in HEI communication departments stemming from digitalization and a changing relationship between science and society (Fürst et al., 2022a).

2.1. Changes in Higher Education and Communication

Recent decades saw changes in the raison d'être of HEIs. In addition to fulfilling their core tasks of teaching and research, HEIs are increasingly expected to fulfill a "third mission" and thus engage with society's needs, respond to market demands, and involve the public in science and its outcomes (Krücken, 2021; Scheu & Blöbaum, 2019). Moreover, the higher education sector has grown and has become more competitive, with most HEIs across OECD countries striving to increase student enrollment, third-party funding, public visibility, and reputation (Entradas & Bauer, 2019; Friedrichsmeier & Fürst, 2012). Accordingly, studies from various countries have demonstrated the increased importance of HEIs' external communication (e.g., Davies, 2020; Elken et al., 2018; Entradas et al., 2020; Leßmöllmann et al., 2017; Schwetje et al., 2017). Indeed, central communication departments produce more output for various channels, including digital media and social media platforms, and have become more strategic in their communication over recent decades (Fürst et al., 2022a; Metag & Schäfer, 2019).

2.2. Strategic Communication of HEIs Online

In line with Raupp (2017, p. 149), we understand the strategic communication of HEIs as their "intentional, internally and externally directed communication that serves to maintain and expand their organizational legitimacy." However, as mentioned previously, in the context of increasing expectations from society to fulfill the "third mission," HEIs not only pursue organizational goals but also societal goals, such as fostering dialogue and supporting open science initiatives (Fürst et al., 2022b). Social media platforms have become an integral part of the strategic communication of HEIs across the world. Platforms such as Facebook, Instagram, Twitter, and YouTube offer organizations a variety of advantages, including the bypassing of journalistic gatekeepers, low-cost dissemination of information, and the tailoring of paid and owned content to multiple stakeholder groups (Davies & Hara, 2017; Metag & Schäfer, 2019). Early studies, however, showed little adoption of social media among HEI communication departments, and when they employed social media, they rarely used it for two-way communication (Beverly, 2013; Linvill et al., 2012; McAllister, 2012). More recent studies indicated that HEIs are catching up on Facebook (Fähnrich et al., 2020; Peruta & Shields, 2017), Instagram (Bonilla et al., 2022; Robinson et al., 2019; Stuart et al., 2017), Twitter (Kimmons et al., 2017; Rutter et al., 2016; Vogler, 2020), YouTube (Meseguer-Martinez et al., 2019; Ros-Gálvez et al., 2021), and WeChat (Feng, 2019). Nevertheless, very few studies (e.g., Witzig et al., 2017) have compared HEI communication across multiple platforms. In fact, scholars recently called for more research to investigate HEIs' use of social media, particularly through more cross-platform studies (Fähnrich et al., 2020; Hansen, 2016; Metag & Schäfer, 2019).

Also, little is known about how different types of HEIs communicate online, with the vast majority of existing literature focusing on research universities (e.g., Metag & Schäfer, 2017). Research on media coverage of research universities and universities of applied sciences in Germany suggests that the size, type, and external funding of HEIs impact the visibility of HEIs in news coverage, in a way that favors large research universities with high third-party funding and research in social sciences and humanities (Friedrichsmeier et al., 2015). Research from Switzerland has revealed differences in educational profile, subject specialization, student profiles, and research involvement of different HEI types (Lepori et al., 2014) as well as in their orientation towards societal and organizational goals (Fürst et al., 2022b), but not concluded on how such differences might affect online communication practices.

2.2.1. Adoption, Use of, and Reactions to Social Media Among HEIs

The adoption and use of social media can be analyzed either at the micro-level of individuals or the meso-level of organizations (Moreno et al., 2015). Kelleher and Sweetser (2012) studied the adoption of social media by US university communicators at the micro-level. At the meso-level, several studies examined the social media adoption of high-ranking universities worldwide (e.g., Valerio-Ureña et al., 2020) or of universities in one country, for instance, UK universities related to Instagram (Stuart et al., 2017), Canadian universities related to Twitter (Veletsianos et al., 2017), and more

recently, Portuguese universities related to Facebook and Instagram (Almeida & Morais, 2020). Findings related to differences between HEIs generally showed higher adoption rates among highly ranked research universities (e.g., Valerio-Ureña et al., 2020) and private universities compared to public HEIs (e.g., Bauer, 2019).

The intensity of HEIs' social media activity—how much content is being posted by HEIs—has been frequently discussed but rarely researched. Scholars have assumed that HEIs in continental European countries use social media rather occasionally and mostly for mimetic reasons (e.g., Marcinkowski, 2022). However, the few empirical studies on this subject produced inconclusive results and were based on small datasets (e.g., Veletsianos et al., 2017). In general, studies have uncovered a wide variety in the extent to which social media was adopted by HEIs, as shown by Bauer (2019) on a broader sample of German HEIs, and in the extent to which social media was used, as shown by Bélanger et al. (2014) for Canadian universities.

Research on user engagement (i.e., likes, shares, and comments) with content published by HEIs on social media is richer and revealed clear differences between "non-elite" and "elite" universities. While "non-elite" HEIs typically experienced low levels of user engagement (e.g., Bélanger et al., 2014; Stuart et al., 2017), "elite" universities tended to receive much higher rates of response—some even comparable to those of larger private sector companies (e.g., Fähnrich et al., 2020).

Existing scholarship on the adoption, use of, and engagement with social media communication tends to neglect small and medium-sized HEIs, as well as specialized HEIs, such as universities of applied sciences or universities of teacher education. The latter provide an interesting case because they have been given equal status in higher education in Switzerland through the accreditation of Swiss universities as a result of the Bologna reform. A research gap is also evident in the analysis of recent developments, with no studies tracking trends and changes across multiple years.

In light of these gaps in scholarship, we asked the following research questions:

> RQ1: How has communication by Swiss HEIs on Facebook, Instagram, and Twitter changed over time?

> RQ2: Does the adoption, use of, and engagement with content differ across social media platforms and types of HEIs?

2.2.2. Characteristics of Social Media Content by HEIs

Studies on the social media content of HEIs come from a variety of research fields, such as higher education, marketing, and strategic communication, and employed quantitative (e.g., Bélanger et al., 2014) and qualitative methods (e.g., Veletsianos et al., 2017). Typically, such studies examined content characteristics and how they related to users' reactions, such as likes and shares (e.g., del Rocío Bonilla et al., 2020). A study aiming to categorize the topics of social media communication content by Fähnrich et al. (2020) found that the research universities listed on Shanghai Ranking's Top 50 strongly focused on research when posting content on Facebook. Other studies have revealed that HEIs in the US disseminate a lot of promotional and marketing-related content on social media (Peruta & Shields, 2018). Early studies indicated that the public and students were the stakeholders most often mentioned in HEIs' social media posts (Bélanger et al., 2014; Beverly, 2013; Linvill et al., 2012). More recently, scholars have argued that HEI communication on social media platforms needs to become more stakeholder-specific in order to foster engagement (Bauer, 2019).

Research has also analyzed how well HEIs have used the affordances provided by social media platforms. Most studies focused on two aspects (e.g., del Rocìo Bonilla et al., 2020; Peruta & Shields, 2018; Stuart et al., 2017): the multimodality of posts (i.e., using visuals to make the content richer and more appealing to audiences) and the hypertextuality of posts (i.e., embedding links in posts to allow for more interconnected communication).

Studies comparing content characteristics across platforms and between different types of HEIs are greatly needed, as existing studies of this type are rare. To close this gap in the literature, we, therefore, addressed the following research question:

> RQ3: How do content topics, stakeholders mentioned, hypertextuality, and multimodality differ across different types of HEIs and different social media platforms?

3. Methods and Data

To answer RQ1 and RQ2, we analyzed all Facebook, Instagram, and Twitter posts of all Swiss HEIs (n = 42) over 18 consecutive years (2004–2021). The sample included three types of publicly funded HEIs: research universities, universities of teacher education, and universities of applied sciences. Given the focus on the meso-level of organizations, we established two criteria for the inclusion of a social media account: (a) it had to be operated in the name of the HEI as a whole, and (b) the account had to be operated by the central communication department. While the first criterion was validated by looking at the description of the account, the second was validated by interlinkage between the website of the communication department and the social media account. Not all HEIs were present on all three platforms, and some HEIs operated from more than one account per platform. Overall, we analyzed 69 Instagram accounts managed by 36 HEIs, 79 Facebook accounts managed by 39 HEIs, and 59 Twitter accounts managed by 33 HEIs. We used CrowdTangle—a public insights tool owned and operated

by Facebook—to gather Facebook and Instagram data, and the Twitter API (academic product track) to collect Twitter data.

The following measurements were employed:

- Adoption: To analyze the social media adoption patterns of all Swiss HEIs, the date of creation for each account was aggregated per platform per year and plotted as a percentage of all HEIs.
- Intensity of use: To analyze the intensity of social media communications by Swiss HEIs, the total number of published posts was calculated for each platform per year and plotted on a timeline.
- Engagement: To analyze the engagement of users with social media communications by HEIs, the average number of user reactions to posts per account was calculated for each year and per platform. User reactions were quantified as follows: (a) Facebook—Total sum of likes (including reactions such as "love," "wow," "ha ha," "sad," "angry," and "care"), comments, and shares per Facebook post; (b) Instagram—Total sum of likes and comments per Instagram post; (c) Twitter—Total sum of likes, retweets, quotes, and replies per tweet.
- Hypertextuality: To analyze if posts contained hypertextual elements, we operationalized two separate variables with binary coding. We coded whether or not a post contained URLs or hashtags. If a post contained URLs, it was also coded where the first or most prominent URL was pointing to.
- Multimodality: To analyze multimodal features, we operationalized three variables with binary coding. We coded whether or not a post contained images, videos, or emojis.

To answer RQ3, we conducted a manual content analysis based on a sample of all Facebook, Instagram, and Twitter posts published by all accounts officially managed by Swiss HEIs that existed in 2019. This translated into 14,930 Facebook messages posted by 75 accounts, 6,671 Instagram posts by 62 accounts, and 20,405 tweets by 51 accounts. The year 2019 was chosen as the best fit for the content analysis, because the data for RQ1 showed a saturation of social media adoption after 2018 across all three platforms, thus making comparisons more valid and findings more reliable after this period. Additionally, at this time communication had not yet been impacted by the Covid-19 pandemic. Due to the multilinguistic nature of Switzerland, the dataset contained posts in German, French, Italian, and English. For analysis, a random sample of 1,500 posts per platform was drawn from the dataset. Based on an established codebook used for previous studies (Vogler, 2020; see Supplementary File), two trained coders conducted the manual coding independently from each other. To code the full sample, the two independent coders continued to double-code content throughout the coding process. Neither coder was told which content was being double-coded. They coded the main topic of a post, distinguishing between research, teaching, and organizational topics (cf. Vogler, 2020), and the main stakeholder mentioned in a post, distinguishing between internal stakeholders of HEIs, students, science actors, societal actors, and posts with no mentions of stakeholders (cf. Vogler, 2020). Intercoder reliability was tested with a random sample of 180 unique posts (60 per platform) coded by both coders. Krippendorff's alpha was very satisfactory for multimodality (.98) and hypertextuality (.96) as well as satisfactory for topic (.80) and stakeholders mentioned (.75).

4. Results

In the following, we present the results of the study, explaining how Swiss HEIs communicate on Facebook, Instagram, and Twitter and how this has changed over time, structured in four sections: adoption of the platforms (Section 4.1), use of the platforms (Section 4.2), user engagement with the content (Section 4.3), and differences in topics and stakeholders mentioned in content (Section 4.4).

4.1. Adoption of Facebook, Instagram, and Twitter Among Swiss HEIs

Our findings with respect to RQ1 show that when the University of Fribourg—a mid-sized research university in the heart of Switzerland—joined Twitter in 2007, it was the first Swiss HEI to do so (Figure 1). Within three years, by 2010, 17 HEIs (36%) had joined as well, including research universities, universities of applied sciences, and universities of teacher education. By 2011, a majority of Swiss HEIs were on Twitter (52%). This number slowly increased over the following 10 years until 2021 when nearly two-thirds of Swiss HEIs (72%) had joined Twitter.

The first Swiss HEIs—two research universities and three universities of applied sciences—joined Facebook in 2009. Within one year, 15 HEIs (32%) had created Facebook accounts, including the first university of teacher education. In 2011 the majority of HEIs (63%) were on Facebook. This number gradually increased until 2018, by which time most Swiss HEIs (84%) were communicating via Facebook. Since 2018, no new HEI joined the platform.

In 2012, two research universities and one university of teacher education became the first among their peers to join the Instagram platform. Within two years, nearly one-third of HEIs were on Instagram (30%), including all types of universities. In 2016, the majority of Swiss HEIs (54%) were on Instagram, with numbers steadily rising until 2021, when more than two-thirds of all HEIs (78%) were present on Instagram.

Regarding RQ2 about differences across social media platforms and across HEI types, the results displayed in Figure 1 show that Facebook is the most widely used

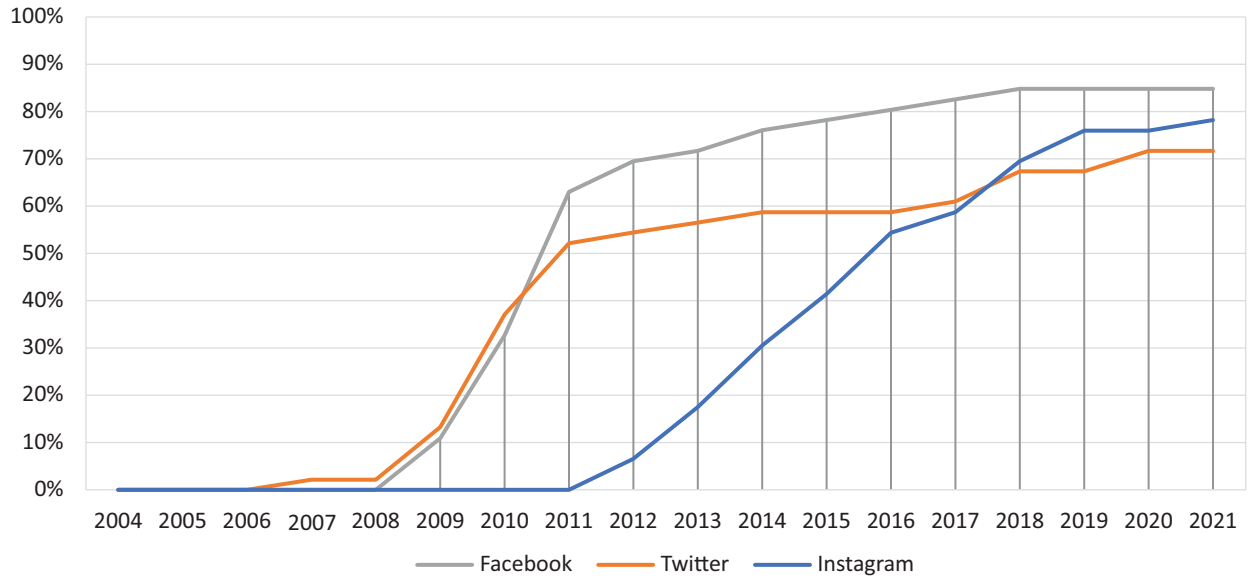

Figure 1. Adoption of Facebook, Instagram, and Twitter among Swiss HEIs. Note: Yearly percentage of HEIs on Facebook, Instagram, and Twitter from 2004 until 2021.

platform (85%), followed by Instagram (78%) and Twitter (71%). The adoption rate on Facebook was the fastest as well, with the vast majority (63%) of Swiss HEIs adopting this channel within a two-year period. The same level of diffusion took twice as long for Instagram and Twitter. The initial uptake was fastest on Instagram, with the first HEI accounts created only a few months after the launch of the platform in October 2010. The adoption rates for Facebook and Twitter were exponential in the beginning, then slowed down after 2011. In contrast, diffusion on Instagram was linear for the period of measurement (2012–2021).

4.2. Use of Facebook, Instagram, and Twitter Among Swiss HEIs

As shown in Figure 2, Swiss HEIs first posted content on Twitter and Facebook in 2010 and on Instagram in 2012. On Twitter, the amount of content posted by research universities showed a steep increase for six consecutive years (2010–2016). The use then stabilized from 2016 and climbed steadily above 1,000 tweets, on average, each year until 2021 (2.7 posts, on average, published by research universities per day). The number of tweets by universities of applied sciences increased for three consecutive years (2010–2013), stabilizing at around 500 posts, on average, for five years (2013–2017). In 2018, the number of tweets by universities of applied sciences rose to 797 on average. From 2019 to 2021, that number decreased, with an average of 522 tweets in 2021. The use of Twitter by universities of teacher education varied across the years, peaking in 2015 with 228 posts published, on average.

On Facebook, universities of applied sciences increased their activities during the first five years (2011–2015)—starting with an average of 146 posts in 2011 and increasing to 447 posts in 2015. After a slight decrease in 2016, the activity of universities of applied sciences jumped and then stabilized at around 650 posts, on average (1.8 posts, on average, published per day since 2017). Research universities started at a low level and increased their Facebook activity during the first five years (2011–2015), starting with an average of 73 posts in 2011 and increasing to 269 posts in 2015. Hereafter, the activity of research universities stabilized at slightly less than 300 posts published a year (0.8 posts, on average, per day). The use of Facebook by universities of teacher education increased slowly to the peak of activity at 139 posts in 2021 (0.3 posts per day, on average).

The first Swiss HEI posted content on Instagram in 2012. Research universities published content 284 times, on average, during their first year, 2013, on Instagram. Afterward, the activity level dropped to half and stabilized at close to 150 posts a year. In 2013, universities of applied sciences started posting on Instagram. Since then (2014–2021), the activity level for universities of applied sciences has shown a linear increase each year, until the current peak of 436 posts was reached in 2021. Universities of teacher education's use of Instagram peaked in 2015 with 135 posts per year, on average, after which the number of posts, on average, decreased until it stabilized after 2018 at around 70 per year.

Concerning RQ2, universities of applied sciences were the most active Swiss HEIs on Facebook and Instagram, while research universities were most active on Twitter, as shown in Figure 2. Clear differences in the intensity of use among HEI types and across platforms also emerged over the years. Swiss HEIs generally preferred Twitter, followed by Facebook and Instagram. During the initial years, research universities and universities of applied sciences posted similar numbers of messages on Facebook and Twitter, respectively. Universities

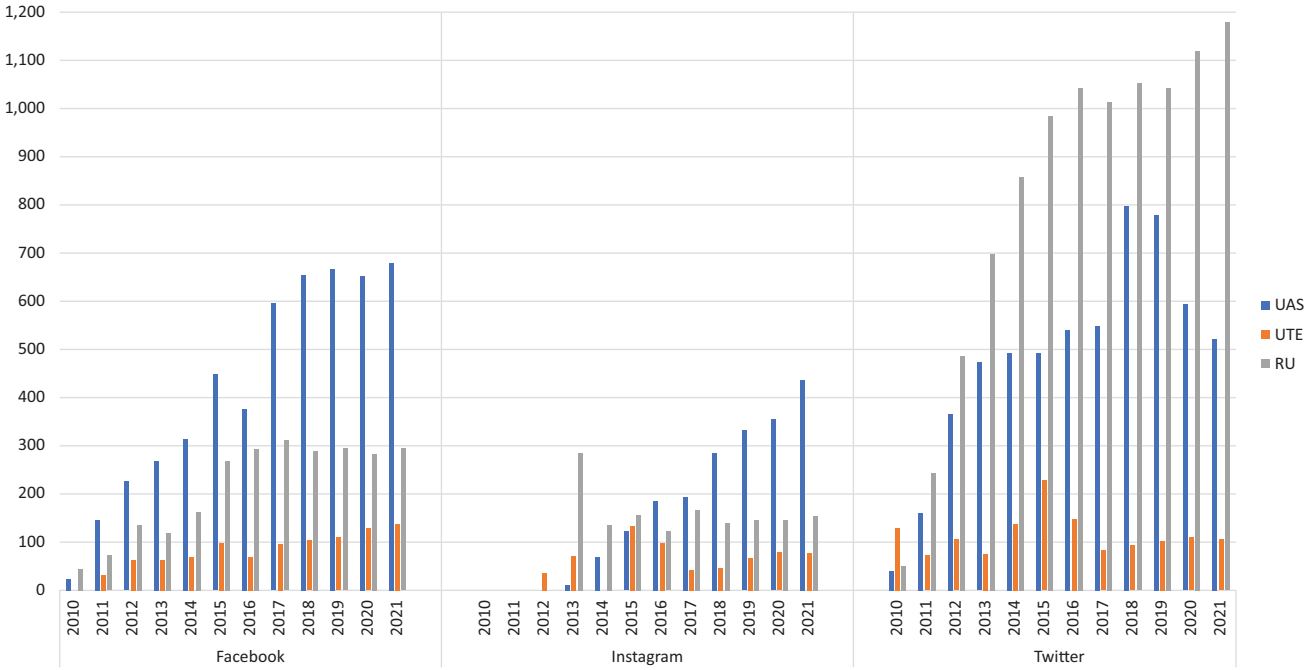

Figure 2. Yearly average number of published posts by HEI type on Twitter, Facebook, and Instagram. Notes: UAS = universities of applied sciences; UTE = universities of teacher education; RU = research universities.

of teacher education used social media significantly less than universities of applied sciences and research universities but more recently have slightly increased their activities across all platforms. Most other trends show continuous growth in or stabilization of social media activity.

4.3. Users' Engagement with Content Published by Swiss HEIs on Facebook, Instagram, and Twitter

About RQ1, user engagement on Twitter as measured by the total sum of likes, retweets, quotes, and replies was low until 2014 when it increased considerably for universities of applied sciences and research universities to an average of 7,207 and 8,080 reactions per annum, respectively (see Figure 3). Engagement with universities of applied sciences' tweets dropped by 80% in 2015 before slowly increasing again in the subsequent three years. Since 2019, engagement with universities of applied sciences' tweets again decreased, leading to a rather low average of 1,768 reactions in 2021. Similarly, engagement with research universities' tweets dropped in 2015 by 56% but increased since then, resulting in a considerable average of 14,008 reactions in 2021. Users' reactions to the tweets of universities of teacher education were very low during the first years and increased slowly since then, to an average of 1,254 reactions in 2021.

On Facebook, users' reactions to content (i.e., the total sum of likes, shares, and comments) were low until 2015, when engagement increased rapidly for universities of applied sciences and research universities, to an average of 8,844 and 11,406 reactions, respectively. Engagement with research universities' Facebook posts increased for three consecutive years, with a peak of 14,692 reactions, on average, in 2017. Afterward, this engagement steadily decreased, leading to 7,960 reactions, on average, in 2021. Engagement with Facebook posts by universities of applied sciences increased over the years, with a peak of 13,523 reactions in 2018. Hereafter, this engagement decreased steadily, resulting in a total of 8,016 reactions, on average, in 2021. Universities of teacher education received a very low yet slowly increasing level of engagement on Facebook until 2019, when it peaked at 2,649 reactions, on average. From 2019 to 2021, this engagement decreased by 60%, leading to an average of 1,033 reactions in 2021.

On Instagram, users' reactions to content (total sum of likes and comments) for research universities were comparably high in 2013 with an average of 3,909 reactions. Afterward, engagement numbers for research universities rapidly increased, with a peak of 59,182 reactions in 2020, as shown in Figure 3. Universities of applied sciences achieved a steady and considerable increase in responses on Instagram over the years, arriving at 52,666 reactions in 2021. Universities of teacher education received their first user reaction on Instagram in 2013. Afterward, user engagement increased slowly until 2020, when it stabilized at around 3,500 reactions per year, on average.

Regarding RQ2, results show that engagement on Instagram was much higher than on Facebook and Twitter (see Figure 3). While engagement with HEIs content on Instagram has risen over the years, it has declined on Facebook in recent years. Twitter data provided no evidence of a general trend across different types of HEIs. The comparison of engagement levels across HEIs showed that research universities were most successful

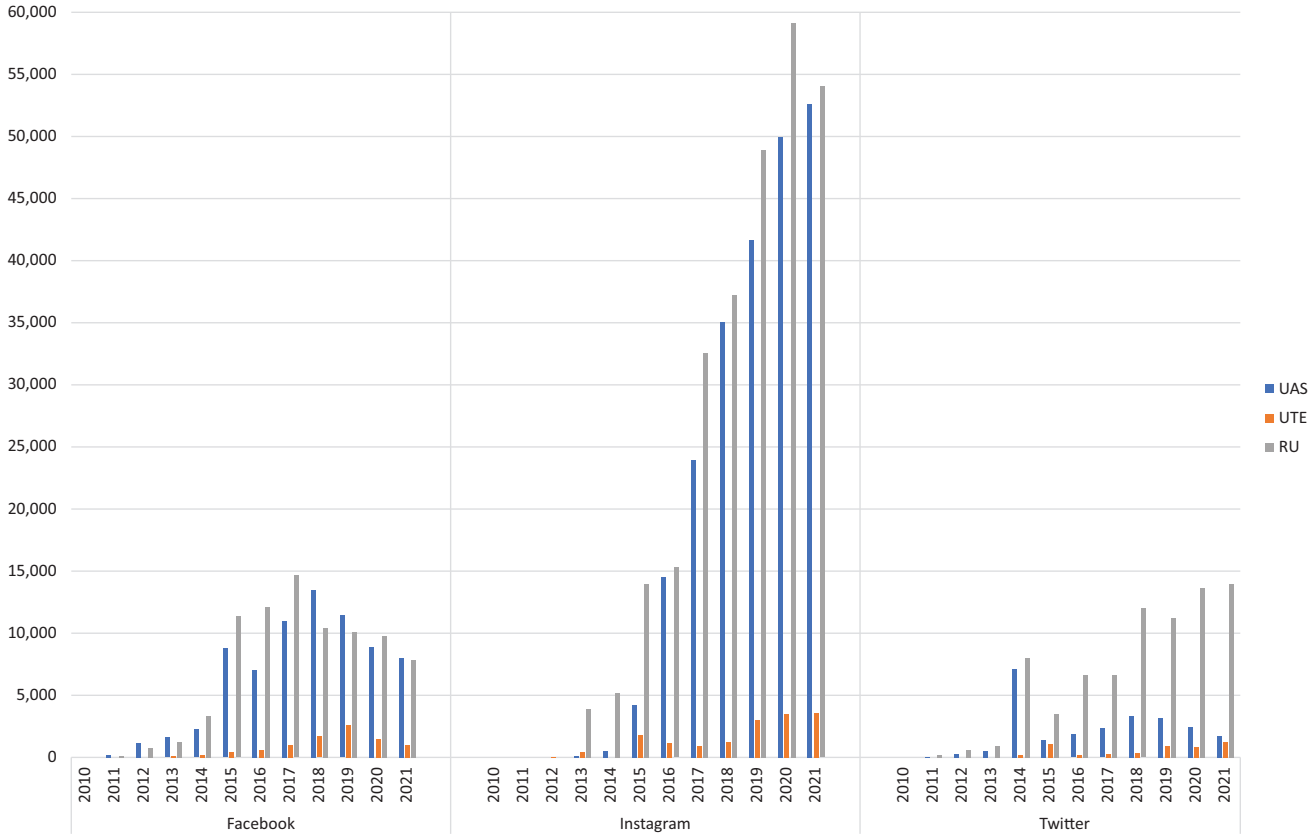

Figure 3. Yearly average number of user reactions to social media posts published by Swiss HEIs on Twitter, Facebook, and Instagram. Note: The mean value (*M*) and the standard deviation (*SD*) were both calculated for each value and are available in Tables I and II in the Supplementary File; UAS = universities of applied sciences; UTE = universities of teacher education; RU = research universities.

in generating reactions across all platforms. Universities of applied sciences received the most reactions on Instagram, followed by Facebook, but attracted rather low engagement on Twitter. Universities of teacher education received much less engagement across all three platforms compared to universities of applied sciences and research universities.

4.4. Differences in Content Topics and Stakeholders Mentioned Among Swiss HEIs on Facebook, Instagram, and Twitter

Examples of content topics coded as "organization" include social media posts related to financing, staff, and governance; topics coded as "research" include scientific results, scientific projects, collaborations, scientific conferences, and applied research with a product or service nature; topics coded as "teaching" include courses, schedule announcements, new teaching offerings, student achievements, and student projects.

Regarding RQ3, Figure 4 shows that 50% of all content posted by research universities on social media focused on organizational matters, followed by posts about research (30%) and teaching (20%). Similarly, universities of applied sciences most often posted about organizational matters (53%). Compared to research universities, however, they attributed more importance to communication about teaching (32%) and less importance to research topics (15%). Universities of teacher education gave equal weight to content about teaching (43%) and organizational matters (41%) while communicating considerably less about research (16%). These differences between types of HEIs held across all three social media platforms, albeit with some variations. Generally, the three topics were more evenly distributed on Twitter and Facebook compared to Instagram. Posts about research were the least frequent on Instagram (7.3% of total share) and most frequent on Twitter (32.4%). Teaching was most frequently talked about on Instagram (38.5% of total share) and least on Twitter (17.7%). Overall, research-related topics across all social media platforms were low for universities of applied sciences (15%) and universities of teacher education (16%), while research accounted for almost a third of the content (30%) posted by research universities.

RQ3 also asked which stakeholders were mentioned in the posts of different HEI types. After coding the main stakeholder of each social media post (including those mentioned directly in the text, via @-mentions or replies) results showed that the most frequently mentioned stakeholders in social media posts by Swiss HEIs were internal actors (see Figure 5)—the HEI staff including

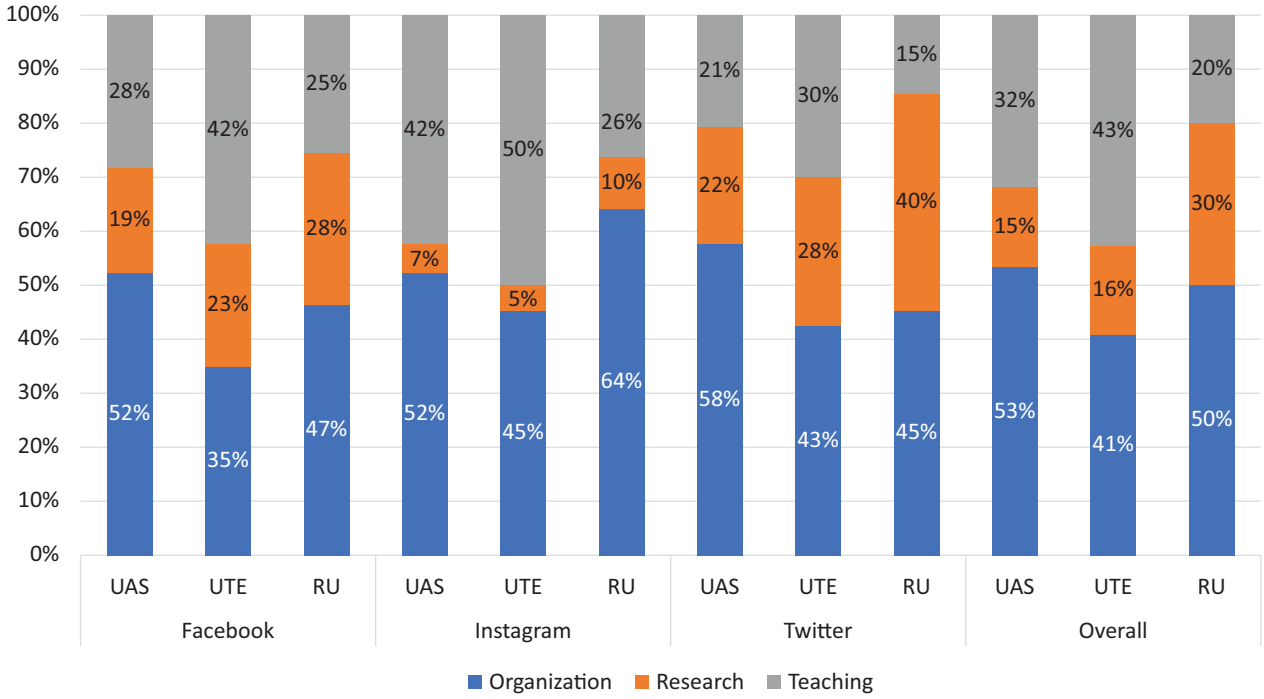

Figure 4. Topics mentioned in social media posts by Swiss HEIs on Facebook, Instagram, and Twitter (*n* = 4,500). Note: UAS = universities of applied sciences; UTE = universities of teacher education; RU = research universities.

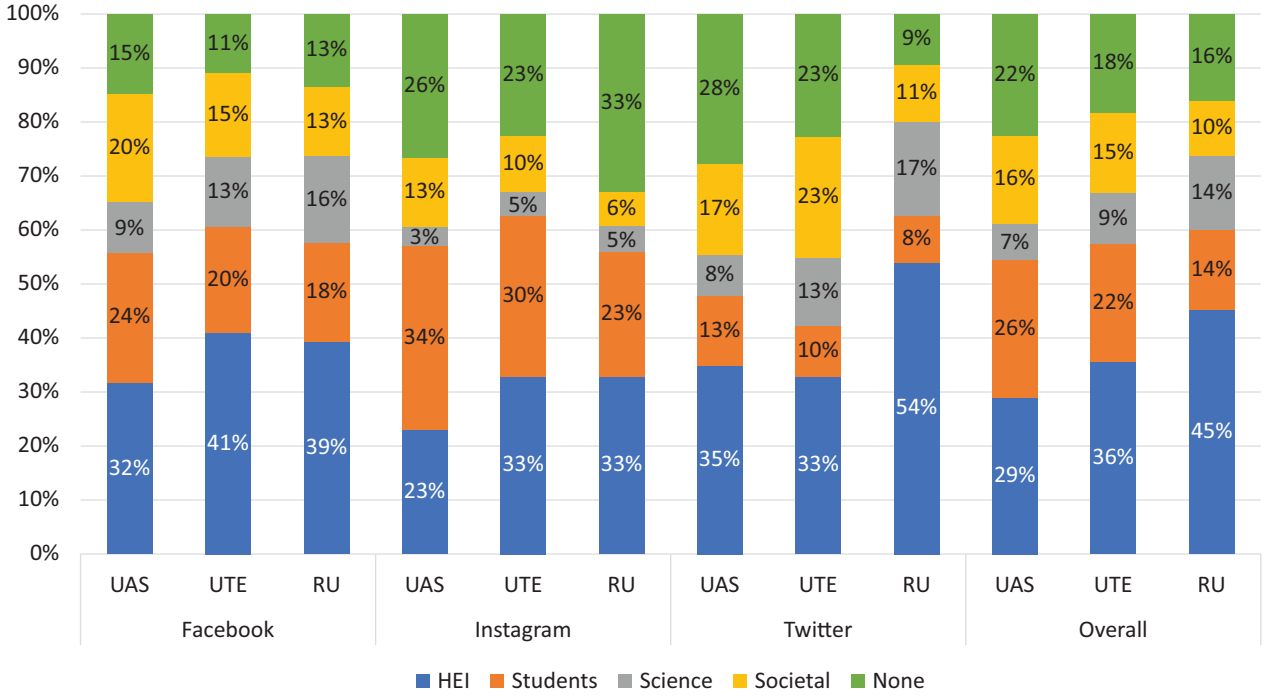

Figure 5. Percentage of total stakeholders mentioned in social media content published by Swiss HEIs on Facebook, Instagram, and Twitter (*n* = 4,500). Notes: Stakeholders coded as "HEI" = individuals or groups who were academic employees or administrative staff; "Students'' = prospective, current, or former students of the university; "Science'' = individuals or organizations that were not "HEIs" themselves but were active in academia, e.g., visiting professors; "Societal" = actors and organizations from politics, media, the arts, culture, and industry; "None" was coded if no identifiable stakeholder was included in the post. UAS = universities of applied sciences; UTE = universities of teacher education; RU = research universities.

its academics. The second largest stakeholder group differed across HEI types: former, current, or prospective students were the second most frequently mentioned stakeholders for universities of applied sciences and universities of teacher education, mentioned in 26% and 22% of all posts, respectively. Research universities' posts gave equal weight to the mentioning of their students and the wider science community beyond the HEI (14%). In comparison, science stakeholders received the fewest mentions by universities of applied sciences (7%) and universities of teacher education (9%). The group of societal stakeholders, such as media, politics, business, the arts, and culture, received the fewest mentions by research universities (10%).

Results for RQ3 related to the differences in the stakeholders mentioned across platforms showed that former, current, and prospective students were the most frequently mentioned stakeholder group on Instagram, while least mentioned on Twitter. The scientific community was the least mentioned group on Instagram. For universities of applied sciences, this was also true for Facebook and Twitter. Societal stakeholders were mentioned moderately across all platforms.

To answer RQ3 regarding hypertextuality, our results displayed in Table 1 showed that embedding links in social media posts was most common on Facebook (61%), followed by Twitter (52%). As expected, the number of URLs posted on Instagram was low (5%) since they are not clickable on the platform.

The URLs themselves were mostly self-referential: Across all platforms and HEI types, they linked most often to the HEIs' websites. This share of self-referential links was highest on Instagram with an average of 75%, followed by Facebook (65%) and Twitter (57%). Links to news media were much less frequent across HEI types, with 16% on Twitter, followed by 13% on Facebook, and only 2% on Instagram. Links to social media content were overall least frequent for all HEI types, with 12% on Twitter, followed by 5% on Facebook, and only 2% on Instagram. URL sources were most differentiated on Twitter and least differentiated on Instagram. More detailed results are available in Table III as part of the Supplementary File of this article.

Hashtags—an additional aspect of hypertextuality—were, by far, most common on Instagram with 90%, on average, followed by Twitter, with 58%, and low on Facebook with only 20% of content including one or more hashtags.

Our results on the multimodality of social media communication by HEIs show that the use of pictures was the most common audio/visual feature used across all three platforms. Instagram had the highest share with an average total of 86% of posts including at least one picture, followed by Facebook with 40%, on average, and Twitter with only 29%. The use of videos was also most common on Instagram with videos included on an average of 14% of posts, followed by Facebook with 12%. Emojis were used frequently by all HEI types on Instagram, with an average total of 38% across HEI types, and were somewhat common on Facebook, with an average total of 22%. Both emojis and videos appeared very rarely in HEI Twitter posts, with 8% and 3%, respectively. Our results showed no significant differences between HEI types with respect to both hypertextuality and multimodality.

5. Discussion and Conclusion

The study at hand is the first to examine an entire country's HEI's social media communication, on the three most used platforms, over a longer period of time. It analyzes all 42 Swiss HEIs including research universities, universities of applied sciences, and universities of teacher education over 18 years. We combined large-scale automated analysis and manual content analysis. In doing so,

Table 1. Hypertextual and multimodal features per platform and HEI.

n = 4,500		Hypertextuality		Multimodality		
		URL	Hashtags	Picture	Video	Emojis
Facebook	Total	61%	20%	40%	12%	22%
	UAS	57%	20%	44%	10%	25%
	UTE	72%	13%	49%	12%	10%
	RU	65%	22%	29%	17%	18%
Instagram	Total	5%	90%	86%	14%	38%
	UAS	6%	87%	84%	16%	36%
	UTE	1%	95%	92%	8%	34%
	RU	4%	95%	87%	13%	46%
Twitter	Total	52%	58%	29%	3%	8%
	UAS	63%	65%	31%	3%	9%
	UTE	45%	55%	39%	4%	16%
	RU	45%	54%	27%	3%	7%

Note: UAS = universities of applied sciences; UTE = universities of teacher education; RU = research universities.

the study provides comprehensive and robust descriptive data on a major facet of organizational science communication that has risen in importance recently (Schäfer & Fähnrich, 2020; Vogler, 2020).

In international comparison, Swiss HEIs show similar adoption rates as Portuguese HEIs on Instagram and Facebook (Almeida & Morais, 2020), Canadian HEIs on Twitter (Veletsianos et al., 2017), and British HEIs on Instagram (Stuart et al., 2017). However, other countries had a faster adoption rate, such as Australian HEIs on Twitter (Palmer, 2016), Italian HEIs on Facebook and Twitter (Oppici et al., 2014), as well as HEIs in the US on Twitter (Linvill et al., 2012).

We found the initial uptake for Instagram—the latest of the three platforms to go live—to be the quickest, with the first accounts created only a few months after the platform was launched, and a steady increase in diffusion in the following years. However, Facebook showed the quickest adoption rate, with most Swiss HEIs creating an account between 2009 and 2011. By now, the diffusion of all platforms among Swiss HEIs has reached a high level and, possibly, a point of saturation.

First, these findings align well with those of other studies (Fürst et al., 2022a; Marcinkowski et al., 2013) reporting on the diversification of HEI communication, including the use of more social media channels. Our data also clearly demonstrate that most HEIs are active on multiple social media channels.

Second, despite the widespread diffusion of all three social media among Swiss HEIs, we found no general increase in the intensity of communication. Regarding the past few years, we only observed a slight increase in the communication of research universities on Twitter and of universities of applied sciences on Instagram. Otherwise, intensity stabilized or decreased across platforms and HEI types. We found clear differences in the intensity of social media communication between different HEI types. Twitter was used most by research universities, while most Instagram and Facebook posts were from universities of applied sciences. Universities of teacher education were much less active across all platforms compared to universities of applied sciences and research universities. These findings align well with similar studies revealing structural variety in communication (e.g., Bélanger et al., 2014) and studies indicating a strong presence of research universities on Twitter (Vogler, 2020). To explain these differences, the affordances of the social media platforms and their user groups as well as the strategic aims of HEI communication may play a role. Nevertheless, recent research on the goals of HEI communication found only small differences between HEI types (Fürst et al., 2022b), insinuating that aims of communication are an implausible explanation. Further research into the influence of social media platforms on HEI communication is needed to confirm and better understand structural differences in communication.

Third, our study demonstrated similarities and differences in HEIs' social media content. Most content across all platforms focused on organizational matters, followed by topics related to teaching. This is a stark and notable contrast to news media coverage about HEIs in Switzerland (Fürst et al., 2021) and beyond (Friedrichsmeier et al., 2015), which has been shown to strongly focus on research.

Fourth, our results on stakeholders mentioned in content showed that the most frequently mentioned stakeholder group across all social media were internal actors (HEI staff), followed by students. Results on hypertextuality and multimodal features show a high adaption of HEI communication to basic platform logic: HEIs use a high variety of visuals and frequently employ hashtags and links combined with the mentioning of relevant stakeholders. Future studies could look into the interplay of such factors and how to optimize communication for better engagement on social media platforms.

Fifth, our results on user engagement showed that it varies between platforms. Considerably more users reacted to HEI posts on Instagram compared to Facebook and Twitter.

Overall, results show a widespread adoption of social media among Swiss HEIs, with a broad portfolio and an intensive and platform-specific use that generates increasing amounts of user interaction and engagement. Earlier, more pessimistic diagnoses about a lack of professionalism and adequate use of social media among HEIs (e.g., McAllister, 2012) seem less warranted based on these results. Nonetheless, the results also suggest pockets of untapped potential within HEIs social media communication: While Instagram is used less, particularly by research universities and universities of teacher education, it is the platform that shows the most user engagement. It would therefore be a potentially fruitful endeavor for HEIs to invest more in communication on this platform.

In addition, our results also suggest that HEIs no longer only use social media as mere extensions of traditional communication formats or to distribute content produced for news media on more channels. Swiss HEIs seem to use social media as more complementary to news media coverage, i.e., as a channel designed for different audiences and focused on topics that legacy media are less likely to pick up. This finding should be verified by future studies systematically comparing news media coverage of HEIs with their social media content.

Notably, however, the strong focus on student marketing reported for HEIs from the—considerably more commercial—higher education systems in the US, the UK, or Canada (e.g., Bélanger et al., 2014) is not as pronounced in Switzerland with its strong publicly funded universities. The primary focus of social media communication by Swiss HEIs is self-referential, directed towards their staff and students, geared towards community and reputation-building, and often referring to organizational and teaching matters. Promotional content still plays a role on their social media but is less pronounced than elsewhere.

Finally, our results show that Swiss HEIs social media communication was surprisingly stable during the Covid-19 pandemic. We did not find a pronounced impact of the pandemic on the intensity, content, or engagement with social media content published by Swiss HEIs during the first two years of the pandemic except for higher engagement with posts of research universities in 2020. This seems to contrast case studies reporting differences in HEIs' social media use during the pandemic (e.g., Bularca et al., 2022) but may also be due to the broad quantitative measures used in our study to facilitate a broad census of all Swiss HEIs.

It must be mentioned that our study also has a number of limitations. While it provides comprehensive and longitudinal data for the most used platforms in Switzerland, it still does not cover the entire spectrum of social media communication. We omitted YouTube, which has gained importance for HEIs communication in the past few years (Meseguer-Martinez et al., 2019; Ros-Gálvez et al., 2021), TikTok, where an increasing amount of science-related content can be found as well (Zeng et al., 2021), as well as other platforms like LinkedIn or Reddit. Moreover, our data collection was limited to Switzerland, which adds a country case to the international scholarship but limits conclusions for other countries. However, the basic measurements used in this study can be applied in future research, thereby allowing comparisons across countries and continents. We used quantitative measurements to analyze the content characteristics and user engagement. By applying qualitative methods, future studies could shed light on user comments and dialogues between HEIs and their stakeholders on social media. Both qualitative and quantitative methods can also enrich our understanding of whether HEI communication on social media has become more professionalized over the years, for instance, by making full use of the available tools and formats of the respective platforms.

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Conflict of Interests

The authors declare no conflict of interests.

Supplementary Material

Supplementary material for this article is available online in the format provided by the author (unedited).

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