

From engagement analytics to curriculum design: Evidence-based training for digital diplomacy in datafied environments

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Abstract: *Datafication of diplomacy is now unfolding through the use of platforms that allow diplomats to measure their "visibility," "engagement" and "performance" as measured by algorithms, and quantifiable data (metrics) from social media interactions. Education and training programs do little to provide future diplomats with tools to interpret or learn from this data, which will be used to evaluate their professional performance. This paper presents new empirical research using engagement analytics (number of likes, comments etc.) from the 162 Facebook posts made by 59 Romanian diplomatic missions, between 2024-2025. The results show significant variations in engagement levels, low levels of dialogue between the public and the missions, and significant differences among the institutions. These findings demonstrate significant deficiencies in knowledge about digital literacy, awareness of how platforms function, knowledge of building and managing online communities and the ability to reflectively learn from data generated through their actions. Based on the findings, the paper provides a curriculum framework for teaching digital diplomacy in universities. This framework uses evidence from the data collected from the social media engagements, and translates it into a series of modules of learning that are consistent with the principles of instructional design and learning analytics. This study links the use of data to teach future diplomats, to discussion on how to teach in the age of digital technologies and provides a model that can be applied to any profession that operates in a technological environment disrupted by data.*

Keywords: Digital diplomacy, Engagement analytics, Instructional design, Learning analytics, Higher education.

1. Introduction

The rapid development of digital technology is changing how organizations function, communicate, and evaluate their results. Organizations can now measure their success on social media and data dashboards using metrics like likes, comments, shares, and reach. This is an example of a larger trend known as "datafication," in which all aspects of society and professional life are constantly being measured, tracked, and improved using data (Kitchin, 2014; van Dijck et al., 2018). Digital Diplomacy is an increasingly important way diplomats interact with audiences worldwide and to build influence. Although the number of studies on Digital Diplomacy has increased over recent years, few studies have examined the

educational process for professionals working within digital platforms.

Existing courses in International Relations, Communication and Public Diplomacy tend to emphasize theoretical aspects of platforms and use them to illustrate theoretical points rather than provide practical tools for evaluating performance, understanding platform logic and developing strategic responses to online communities. The lack of emphasis on data-driven decision-making is particularly problematic given the increasing reliance on data for strategic planning and evaluation in many organizations. The findings of previous studies regarding the requirements of education in cybersecurity and cyberdiplomacy are similar in terms of a requirement for interdisciplinary and adaptive educational models that can be developed as quickly as digital practice is changing (Vasiloiu, 2022; Vevera, Cîrnu & Vasiloiu, 2024).

The development of new technologies in recent years has created significant challenges for educators as they attempt to update curricula to reflect changing professional requirements and expectations. Performance metrics and feedback loops can function as signals for learning, providing evidence of what individuals and teams need to develop as a result of their experience, and enabling them to reflect on their actions and adjust accordingly.

From this perspective, engagement analytics in digital diplomacy are not simply measures of communication effectiveness, but also indicators of whether there are competence gaps and learning opportunities in place for those involved. Therefore, this study seeks to demonstrate the importance of engagement analytics in informing the development of educational programs for digital diplomacy, and to identify the areas of greatest need for further education and training based on the experiences of Romanian diplomatic missions' social media usage.

2. Engagement data: An indirect way to understand competences

Data related to engagement on social media platforms (likes, comments, shares) are the most common metrics to measure the response of the audience in a platform-based communication context. These metrics are inherent to the architecture of the social media platforms and are generated in real-time through the usual communication practices in social media. Research has demonstrated that these metrics contribute to the perception that institutions have about success, priorities and strategic adaptations (Kitchin, 2014; van Dijck, Poell & de Waal, 2018). Therefore, interpreting and responding to engagement data is a hidden requirement for professionals working in these environments.

To understand engagement analytics, one needs to consider the logic of the platform. Platforms are designed to maximize interactions and attention. Consequently, only content that elicits an emotional response, is visually appealing and rapidly circulating will be privileged (van Dijck, Poell & de Waal, 2018). Not all types of institutional communications are perceived as visible or rewarding by the algorithms (van Dijck, Poell & de Waal, 2018). Thus, engagement metrics will reflect both the audience's behavior and the platform's emphasis on certain types of content.

Across the empirical material analyzed for this study, engagement is asymmetrically distributed among different types of content. Content focused on affective, cultural or identity-related themes, typically receives significantly more engagement than posts focused on administrative or policy-related topics. The study's findings align with other studies examining digital diplomacy, which indicate that official institutional discourse often has limited success in environments where there is competition for attention and in which visibility is determined by algorithms (Bjola & Holmes, 2015; Manor, 2019).

2.1. Empirical patterns and institutional differences

In the empirical study, there is a clear distinction in terms of how different institutions use social media platforms based on engagement level. The study has demonstrated that some embassies were able to obtain higher levels of social media activity and create higher levels of engagement than others. Even though embassies had similar communication mandates, some were successful at creating visible and interactive engagement while others were not. Variations in engagement levels cannot be explained solely by the size of the audience or embassies geographic locations, thus institutional practices and content design also play a role.

From an analytical point of view, institutional differences in engagement levels indicate institutional differences in how professionals interact with digital platforms and interpret feedback. Many institutions seem to operate on habitual communication practices, which are poor fit with the affordance of platforms. While engagement analytics are readily available for systematic reflection and improvements, they are very rarely used as such.

The findings from the study are consistent with broader observations in data-driven environments, where the availability of metrics usually greatly exceeds the ability to make meaningful use of them (Kitchin, 2014). Data becomes descriptive and reinforces the existing ways of doing things instead of enabling learning and innovation.

2.2. Engagement analytics as unintended learning signalling

Learning analytics research highlights that data can support learning when there are clear objectives, reflective interpretation and feedback cycles (Ferguson, 2012; Siemens & Long, 2011). Although the engagement analytics in digital diplomacy were not intended as a tool to support learning, they act as unintended learning signals, as they provide information regarding what type of content generates attention, how the audience responds and where communication strategies fail to elicit an adequate response.

The findings of the study indicate that the learning signal provided by engagement data are largely unused. Engagement data are visible but not systematically interpreted to serve as a feedback mechanism for professional learning. This represents a more general challenge described in the literature on education and technology, in which digital tools produce vast amounts of data

without any corresponding pedagogical framework to facilitate the interpretation and the development of skills (Selwyn, 2019).

The absence of a structural learning strategy can cause the use of analytics to become superficial measurements of the popularity of content or tools rather than as a means of facilitating reflective practice and adaptive learning. This will limit the capacity of both individuals and organizations to learn in digitally mediated professional environments.

The patterns used for engaging in social media as analyzed by social media engagement analytics indicates that there are repeated patterns of incompetence in regards to the following: data literacy, social media awareness, and online community dynamics. These are common to many professionals who work in datafied environments and whose performance is constantly being assessed and compared (van Dijck, Poell & de Waal, 2018).

The recent advancements in both learning analytics and artificial intelligence in education offer an appropriate theoretical framework for analyzing engagement patterns using digital diplomacy. The post-2020 literature has noted a transition from the use of descriptive measures of engagement towards data-driven, explanatory models of engagement that incorporate behavioral indicators, contextual indicators, and indicators of algorithmic visibility (Salas-Martínez & Ramírez-Martinell, 2024). Additionally, research has been conducted on AI-based analytics and its increasing application of unsupervised learning methods and clustering techniques to identify hidden participation patterns and institutional communication styles across multiple digital platforms (Khalil & Ebner, 2022). Both trends are consistent with the methodology employed in this study; specifically, TF-IDF vectorization was used to extract dominant typologies of embassy communication and K-means clustering was used to determine dominant engagement logics. Therefore, framed in the context of the most recent learning analytics theory, digital diplomacy can be viewed as a type of institutional learning in a platformized environment where diplomatic missions adjust their communication strategies based on measurable audience responses and data-driven feedback loops.

3. Empirical results: Engagement patterns and digital practice

The main empirical results of this study are presented below. They were developed using a database containing 162 Facebook posts that were created between 2024 and 2025 by 59 of the official Romanian embassy and consular pages. The engagement indicators (likes, comments, and shares) of each post were analyzed along with the characteristics of the content so that dominant communication patterns and levels of audience participation could be identified. Additionally, the institutional variations can be identified, which will serve as the empirical basis for the curriculum framework provided in the next section.

To provide for an understanding of how empirical research findings are being interpreted transparently, posts were classified into thematic categories

utilizing a two-step process that combined automated text processing with unsupervised machine learning. First, all post texts were pre-processed using common NLP (Natural Language Processing) methods such as: converting text to lowercase; removing punctuation and stop words; tokenizing; and lemmatizing. Next, the cleaned corpus was vectorized via TF-IDF (Term Frequency-Inverse Document Frequency) in order to understand the relative use of terms across posts. Based on this representation of the corpus, KMeans clustering was used to group posts that share similar lexical and semantic characteristics. After grouping, the groups were analyzed and labeled based on their most significant terms and recurring themes (i.e. affective/celebratory, administrative, cultural, institutional), as opposed to being pre-coded manually. For Figure 1, the word cloud was produced from the entire pre-processed corpus, with term frequency determined by TF-IDF scores and a minimum frequency threshold set to remove noise and improve readability.

All of the comparative work in this chapter is based upon clear definitions of and consistent application of criteria as well as normalized engagement metrics used to account for variations in audience sizes and post frequencies when comparing posts and/or posts across embassies. The style of communication and the performance of institutions were determined through the combination of quantitative measures (i.e., engagement distributions and cluster frequencies) and qualitative interpretations of cluster specific vocabulary. For Figure 1, the word cloud was created using all of the pre-processed data and the salience of each term was weighted by TF-IDF scores. In addition, a minimal frequency threshold was applied to eliminate noise and improve interpretability. Use of these methodological approaches ensured that classifications, comparisons, and analytical descriptions were based upon computationally reproducible processes which increases both the rigor and transparency of the findings.

3.1. Engagement patterns of different content types

The engagement patterns in the content of the posts analyzed in this research show an extremely uneven distribution of engagement among the different types of content. Posts classified as either affective/celebratory (national holidays, greetings, commemoration etc.) were those that received the highest engagement level. Although these posts represented a smaller percentage of all posts analyzed, they comprised a disproportionate number of total likes, comments, and shares. To illustrate the dominant thematic focus, Figure 1 presents a word cloud of the most frequent terms used in the analysed Facebook posts.

To analyze how visible or "seen" posts relate to engagement, as shown in Figure 2 illustrates the relationship between the number of likes (an indicator of visibility) and the number of comments (a measure of dialogic participation), on the analyzed posts. The scatterplot demonstrates that there is no direct correlation between being seen and being talked about.

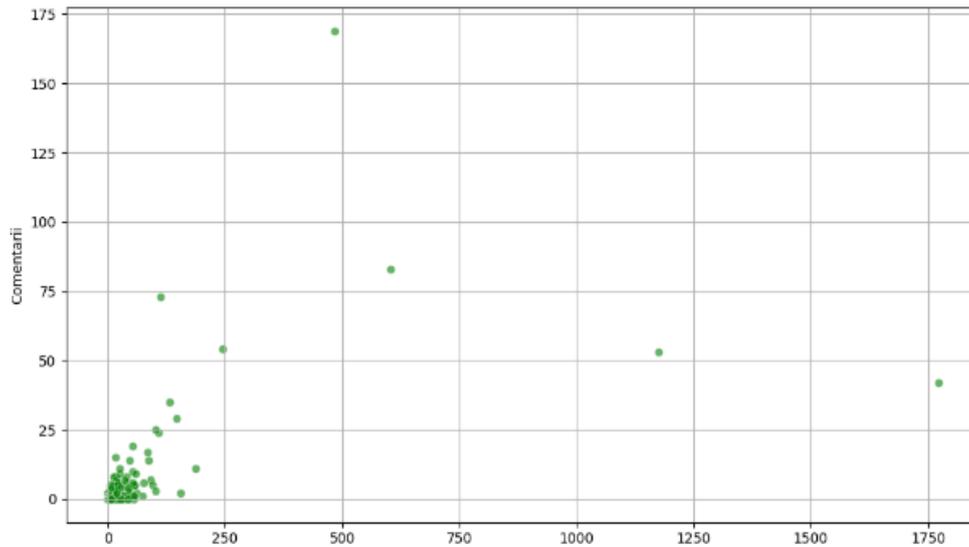


Figure 2. Relationship between likes and comments across posts

Statistically, the difference in numbers of likes, comments, and shares shows that, despite social media having interactive capabilities, the overall level of intensity of conversation, and the amount of community engagement is typically low.

3.3. Institutional variation in engagement rates

There is also considerable variation in the engagement levels of institutions. A relatively small number of embassies were responsible for a large proportion of the total engagement, while the majority of the other embassies remained essentially invisible. The variance in engagement cannot be fully explained by the frequency at which the embassies posted, nor by the size of their respective audiences.

Embassies operating in countries with large Romanian diaspora communities tended to achieve higher engagement rates, however, even among these groups there was considerable variance in the engagement rates of individual institutions. Institutions with smaller audiences, but whose content and communication strategies were designed to promote engagement, achieved significantly higher engagement rates than institutions with larger audiences whose engagement rates were significantly lower. Therefore, the design and implementation of content and communication strategies appear to be more important determinants of engagement than structural factors alone.

The level of engagement varies significantly among the diplomatic network's institutions, as shown in Figure 4 which includes the average engagement per post by the top ten most engaged Romanian embassies. These results support the idea that the diplomatic network has no consistent communication strategy.

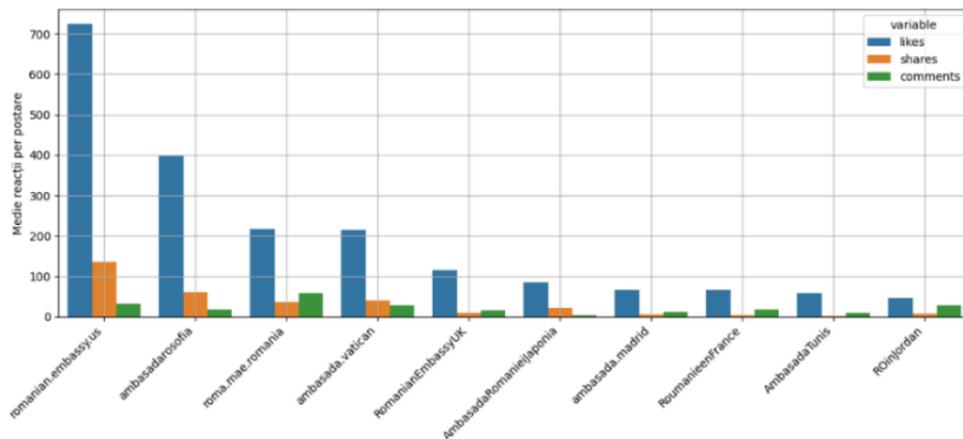


Figure 3. Average engagement per post for the ten most visible Romanian embassies

Additionally, the fact that no consistent patterns emerged across the institutions studied suggests a lack of a unified strategy or coordinated learning process among the diplomatic network.

3.4. Visibility, online presence of communities, and digital inequality

Geographic analysis of engagement levels demonstrated that visibility is geographically concentrated in Western Europe and North America, likely due to a combination of diaspora distribution and institutional focus. Conversely, embassies operating in geographic areas with smaller Romanian communities or limited digital activity exhibited consistently low engagement.

Therefore, the uneven distribution of engagement serves to highlight a type of digital inequality in the ability of institutions to communicate effectively via social media, as some diplomatic actors are able to leverage existing strong online communities, while others are relegated to the periphery.

Moreover, the data suggest that these inequalities may be self-reinforcing, as highly visible accounts continue to attract engagement, while low-performing accounts are unable to generate sufficient interest to become engaged themselves.

The quantitative analysis of engagement data illustrates a number of recurring themes: engagement levels are highly skewed towards affective and cultural content, administrative/ political content produces negligible levels of engagement, likes comprise the overwhelming majority of engagements, while comments and shares are relatively rare, a small number of institutions produce the vast majority of engagement and institutional engagement levels vary independently of the size of the institution's audience and/ or the frequency at which it posts.

Collectively, these findings illustrate that social media-based Romanian digital diplomacy is active, but weakly interactive, highly unequal, and out-of-sync with the dynamics of social media platforms. The empirical findings of this research provide direct evidence of the need for improved, data-informed communication strategies and professional development to address the current shortcomings of the curriculum framework provided in the next section.

4. A curricular framework based on empirical research for digital diplomacy

The findings of the previous chapter demonstrate consistent patterns of engagement, visibility, and interaction, revealing specific deficits in terms of digital diplomacy competency. This chapter will develop an empirically based curricular framework to address those competency gaps through specifically designed instructional materials.

The empirically based curricular framework described below takes empirical research and transforms it into structured instructional units that align with general principles of instructional design. The goal of this framework is not to specify one training model, but to provide a transferable structural template that can be applied to higher education degree programs in the field of digital diplomacy, international relations, communication studies, or other related areas. The framework adheres to the principle of constructive alignment, providing a logical link among identified learning requirements, intended learning objectives, instructional activities, and evaluation strategies (Biggs & Tang, 2011).

4.1. Pedagogical foundations and design philosophy

The curricular framework is underpinned by several pedagogical philosophies derived from the empirical research and validated by current literature. Engagement metrics were viewed as learning inputs instead of as measures of ultimate success. The empirical research indicated that while there was an abundance of engagement metrics available to users, they were very seldom used as evaluative instruments for improving user experience. Consistent with learning analytics literature, the curriculum emphasizes using engagement data for interpretive purposes and for reflecting on user behavior rather than solely optimizing metric outputs (Siemens & Long, 2011; Ferguson, 2012).

The curricular framework places greater emphasis on developing platform literacy versus platform-specific training. The empirical research revealed a significant disconnection between institutional communications and platform dynamics. Therefore, the curriculum focuses on understanding how algorithms create visibility, how data creates visibility, and how economic models create attention, rather than focusing on the specific social media tools (van Dijck, Poell, & de Waal, 2018).

Moreover, the curricular framework views digital communication as a community-focused activity. The large amounts of passive engagement documented in the empirical research underscore the need for students to develop competencies in participating, engaging in dialogue, and creating social presence — all critical competencies for successful digital diplomacy practitioners (Bjola & Holmes, 2015; Manor, 2019).

The curriculum includes ethical awareness and reflexivity as two key competencies. Public institutions using platforms raise significant questions about trustworthiness, responsibility, and how data are used, and these questions cannot be treated as secondary or optional (Selwyn, 2019).

When compared with present-day Digital Diplomacy Training Models, the proposed Curriculum Framework for Digital Diplomacy will advance the field of Digital Diplomacy Education through an explicit integration of Data Analytics & Platform-Based Learning. Most current Digital Diplomacy Training Initiatives (short term digital diplomacy courses offered by Foreign Ministries, International Organizations, etc.) tend to be based on Social Media Communication Skills, Public Diplomacy Messaging, Cybersecurity Awareness; and most are taught using Modular/Workshop based formats. Although the current models are designed to provide students with practical competencies, they do not typically include Systematic Learning Analytics; AI Supported Content Evaluation; or Reflective Feedback Mechanisms. The Framework proposed in this study is a Data-Informed Pedagogical Model which combines Engagement Analytics; Content Clustering; and Iterative Learning Loops to Support Evidence Based Decision Making in Digital Communications. As such, the proposed Curriculum Framework positions itself within the current trend of AI-Enhanced Education/Learning Analytics, while providing Digital Diplomacy Training that is not limited to the development of Competency Acquisition, but rather Adaptive; Analytics-Driven Professional Development.

4.2. Modular structure of the curriculum and instructional units

The above modules are structured based on the following principles:

Module 1: Digital Diplomacy in Mediated Platforms

This module identifies a large gap in professional communication (diplomatic) between mediated platforms and traditional forms of diplomatic communication. Module 1 introduces digital diplomacy as a professional practice that is shaped by media logic, the need for algorithms to provide visibility, and audience feedback. The conceptual understanding of digital diplomacy, the platform affordance, and implications of datafied communication for the roles and responsibilities of institutions, are the learning outcomes of this module.

Module 2: Platform Logic and Algorithmic Visibility

The empirical study found that most of the content posted is emotional and very few of those who post have a good understanding of how platforms function. Module 2 teaches students about developing their own understanding of how platforms curate information and create visibility using different mechanisms, and how to be able to differentiate between audience behavior and platform amplification. The student assessments assess whether students can critically evaluate engagement metrics and can identify the inherent constraints and bias of the platforms they use.

Module 3: Engagement Analytics and Data Literacy

Module 3 addresses the imbalance between likes, comments, and shares, and provides students with the necessary skills to develop data literacy so that they may be able to effectively analyze engagement metrics and be able to separate between descriptive metrics and actionable insights.

Learning activities focus on providing students with the opportunity to contextualize data, recognize the limitations of engagement metrics, and utilize analytics to improve engagement and performance rather than to compare engagement performance.

Module 4: Online Community Dynamics and Participation

The low levels of dialogic interaction that were documented in the empirical study indicate that students do not possess the requisite skills to interact with community members.

Module 4 examines the theoretical and practical aspects of online communities, social presence, and participatory communication. Module 4 educates students how to develop communication strategies to create interaction, manage feedback, and build long-term relationships in institutional environments.

Module 5: Reflexivity, Feedback, and Continuous Improvement

The fact that there was no variation in communication pattern stability over time, despite varied engagement results, indicates that students are not capable of applying reflective learning. Module 5 provides students with learning analytics concepts related to feedback loops, reflection, and continuous improvement. Module 5 educates students on translating engagement data into strategic changes, facilitating both individual and organizational learning.

Module 6: Ethics, Trust, and Accountability in Data-Driven Communication

Module 6 examines the ethical and normative issues associated with data-driven communication, including credibility, impersonation, and responsible data use. Module 6 locates digital diplomacy within broader debates regarding public values, institutional trust, and accountability in the platform society.

5. Limitations and areas for future research

Although this study has provided significant contributions to our understanding of digital diplomacy as practiced through social media platforms and has addressed some of the existing gaps in the literature, there are several limitations of this study that require acknowledgement.

One limitation of the study is that it focuses solely on the Facebook platform. Given the continued relevance of Facebook to both institutional communication and diaspora engagement, however, the use of only Facebook limits the generalizability of the study's findings. Other social media platforms such as Instagram, X, TikTok, and YouTube have differing logics of engagement, and future research should seek to analyze engagement patterns across multiple platforms to provide a more holistic view of the ways in which digital diplomacy is being practiced.

A second limitation of the study is that the dataset is relatively small in terms of both time period and number of posts. The data set is comprised of 162 posts from 2024 to 2025. This amount of post will allow us to find common engagement patterns among audiences, but due to the short time frame we cannot determine how well institutions are engaging over time with diasporic populations nor what adaptations are being made by institutions in terms of their digital diplomacy efforts. Future research should include data from multiple years in order to analyze trends in crisis response, institutional adaptation, and other dimensions of public diplomacy.

Additionally, a third limitation of this study is that while the number of likes, comments, and shares can be used as indicators of the level of interaction and visibility for an institution's social media content, these indicators do not measure the level of influence, persuasion, or attitude change that may result from exposure to an institution's content. Therefore, future research should utilize both quantitative measurements of social media engagement (likes, comments, shares) and qualitative methods (surveys, interviews, content analyses of comments), to create a more accurate representation of the perceptions of institutions held by audience members and their subsequent actions.

A fourth limitation of this study is that the curriculum design framework presented in this paper is conceptual and design-oriented. While the framework has been developed from empirical findings, its effectiveness has yet to be evaluated in an educational setting. Therefore, future research should assess the implementation of the curriculum in a higher education or professional training program and subsequently evaluate learning outcomes, participants' experiences, and the potential long-term effects on professional practice.

Lastly, future research could explore the potential uses of advanced analytics and artificial intelligence in the education of digital diplomats. Specifically, researchers could examine the uses of automated sentiment analysis, misinformation detection, and decision support systems and further consider how these technologies can be responsibly integrated into educational designs to better understand the relationship between learning and professional practice in a data driven world.

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