Country Characteristics, Internet Connectivity and Combating Misinformation: A Network Analysis of Global North-South

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Abstract

Analyzing data on 152 countries using network and regression analyses, this study examined how countries' positions in the global Internet network are associated with their political, economic, and technological characteristics, and how those characteristics are related to media, information, and digital (MID) education programs in the countries. This research shows countries with higher levels of international Internet bandwidth capacity, Internet use, and press freedom status are more likely to have MID programs that are comprehensive. Differences between Global North and Global South countries were significant both in terms of Internet capacity and use and in terms of MID complexity and dimensions. MID literacy education is an important long-term solution to misinformation, as such education informs people's epistemological beliefs which in turn have direct effects on their comprehension of various issues and topics. This study offers important scholarly and policy implications in the areas of digital connectivity, MID literacies, misinformation, and international communication. In particular, it offers guidance for comparative studies in this area.

1. Introduction

The 2019-20 coronavirus pandemic has highlighted challenges countries face in mitigating negative consequences of misinformation online. In spring 2020, unproven claims such as taking a hot bath or using chloroquine to combat the virus were circulated on various social media channels [1] [2] [3]. A man in Arizona in the United States died after drinking chloroquine as a measure to fight against the virus [1]. In India, social media videos including coronavirus-related misinformation targeted at Muslims were so widely spread on Facebook and TikTok that in April 2020 the country's Ministry of Electronics and Information Technology asked the two social media companies to remove users found to be spreading the misinformation [2]. The World Health Organization called this phenomenon an "infodemic" of misinformation amid the coronavirus crisis [3].

Misinformation is a multi-faceted problem with individual researchers, governments, and nongovernmental organizations defining and approaching it in various ways [4] [5]. Some solutions to misinformation have focused on developing computational methods to detect and deter misinformation, while others have emphasized the importance of strengthening citizens' abilities to assess information online. In fact, the latter approach of educating citizens about information quality has long been a part of governmental and nongovernmental efforts in many different countries [6] [7] [8]. In particular, media, digital, or information literacy education is an important long-term solution to misinformation, as such education informs people's epistemological beliefs which in turn have direct effects on their comprehension of various issues and topics [9] [10]. In addition, previous research on media and information literacy suggests that strategies of engaging citizens in this area should take into account the variety of political, cultural, social, and economic contexts facing a particular country or community [7] [11] [12].

In this study, we examine how these contextual characteristics of countries are associated with media, information, and digital literacy efforts in different countries. Specifically, we examine how a country's position in the global Internet network is related to its political, economic, and technological characteristics,

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and then how those characteristics are associated with aspects of media and information literacy education prominent in the country. In particular, we analyze whether there are meaningful differences between countries categorized as Global North and those identified as Global South in areas they emphasize in promoting skills and competences related to the literacies. As specified in Section 2.3., countries classified as Global North tend to be more economically and socially advanced than countries classified as Global South [36]. We also explore implications of these literacy skills for those countries' efforts to combat misinformation. While some previous studies analyzed different media, digital, or information literacy initiatives in different countries [7], there is little research on how patterns of such literacy efforts in different countries might be associated with various country characteristics. The comprehensive and comparative analysis offered in this paper contributes to advancing the scholarship in the areas of information communication technologies, media/information/digital literacy, and international communication. This research also helps policymakers, advocates, and activists to better understand underlying contexts of misinformation-related issues and to develop more relevant policies and resources.

2. Literature Review

2.1. Media/Digital/Information Literacy Efforts Around the World

Understanding how to enhance citizens' abilities to interpret news and information and evaluate the quality of information has been a key concern of governmental and nongovernmental agencies [4] [7] [13]. Media literacy, information literacy, and digital literacy are the most widely used concepts in this area [14] [15]. While each puts an emphasis on a particular area of literacy, there is significant overlap between the three concepts. For example, media literacy focuses on how to navigate through the flood of information pouring out of an ever-increasing number of media outlets [7]. Information literacy emphasizes the ability to critically assess the quality of information [16] [17], whereas digital literacy refers to skills associated with locating, evaluating, creating, and using information sourced via digital technologies [18] [19] [20]. In particular, scholars have noted similarities between digital literacy and information literacy in this rapidly changing communication environment. For example, digital literacy has been widely considered to cover both technological and content aspects [18] [21]. In this sense, Metzger et al. [15] proposed integration of both concepts—digital literacy and information literacy—in analyzing online information assessments. Using the term "digital information literacy," Metzger et al. examined young adults' awareness of potential credibility problems and their skills in utilizing online information assessment practices. In sum, all three literacies cover skills and competencies related to evaluating information online.

Media, information, or digital literacy has been part of formal or informal education activities around the world [8] [22] [23]. Through their analysis of media literacy education in European Union member countries, Petranová et al. [8] showed that the EU countries focus on critical thinking/analysis of media content, online safety, technical abilities and skills concerning the use of information and communication technologies, and knowledge about creation of news content and legal and practical aspects of journalism. The scholars noted differences in media literacy education among the EU countries reflecting historical, cultural, and social contexts of each country. Similarly, an analysis of leading media literacy projects in 28 European countries showed that critical thinking was covered in the majority of the projects (403 out of 547) examined for the study [6]. These studies emphasized the importance of civil society in offering media and information literacy education for different groups.

In the wake of the Arab Spring in the early 2010s, there have been increased calls for expanding or improving media and information curricula in the Middle East and North Africa region [13]. Different countries in the region reported facing different challenges to achieve this, with a lack of resources or support from policymakers cited as some of the major obstacles in most countries. For example, Tayie [24] wrote, "The main challenge to media and information literacy in Egypt lies with policy makers. There is no policy on the matter. Some scholars and experts tried to include representatives from the Ministry of Education and Ministry of Higher Education in most of these activities but the problems and obstacles usually came from policy makers and those working at the Ministry of Education" (p. 112). This finding is, in fact, in line with that from a study based on interviews with experts on media and information literacy, which cited overloaded curriculum in the classroom, low-level of continuing training for teachers, and resistance from governmental agencies as major challenges for media and information literacy curriculum design and development in different countries [25]. In the next section, we discuss how the prevalence of misinformation online has become an important context of offering media, information, or digital literacy education.

2.2. Misinformation & Literacy

Media, information, and digital literacies have received increased attention in recent years, as many parts of the world have observed negative consequences associated with increased spread of misinformation online [26] [27]. For example, ahead of the 2020 presidential election, fabricated websites about Democratic presidential candidates and false claims about political issues were major problems in the United States, which was already hit by Russian disinformation campaigns during the 2016 elections [28]. Amid the coronavirus pandemic (or COVID-19) 2020, misinformation about causes or cures of COVID-19 spread widely online in many different countries [3].

In this context, scholars, policymakers, and practitioners have explored ways of enhancing media, information, and digital literacy education so that citizens are better equipped to assess online information. For example, libraries, universities, and technology companies have devised educational programs or materials aimed at addressing relevant issues [29] [30]. An increasing number of higher education institutions in the United States have strengthened their courses on online information consumption teaching how to better discern websites that purposely fabricate information or spread state-sponsored propaganda or disproven conspiracy theories [31]. In addition, sites dedicated for helping people identify misinformation shared toolkits such as "How to Spot Fake News" published by FactCheck.org [29].

Studies have examined effects of these media, information, and digital literacy efforts on citizens' abilities to assess quality of information online. For example, Kruger's study [32] at the University of Hong Kong showed that an experiential learning project of developing undergraduate students' online information assessment skills resulted in a significant increase in the quality of assessment techniques and critical thinking by the students. Similarly, Seo et al. [4] found that digital information literacy workshops to older, low-income minority adults in the United States helped them better evaluate health-related information online.

Strengthening critical thinking skills among citizens is an important aspect of inoculating against the spread of misinformation. In analyzing effects of critical thinking on information consumption, Schmitt et al. [10] focused on the promotion of critical media literacy against extremist propaganda. Specifically, they examined the extent to which three learning arrangements—awareness (defining propaganda), reflection (reflecting on everyday media usage), and empowerment (dealing with propaganda)—are able to promote critical media literacy with regard to extremist messages. The scholars argue that "when framed appropriately (in the classroom or through critical media literacy), counter-messages could unfold a stronger inoculating effect than when being distributed without such context" (p. 15). Horn and Veermans [33] analyzed how critical thinking skills developed through educational curricula may transfer to external contexts of students' daily online interactions. Based on a comparative study examining critical thinking efficacy and transfer among U.S. and Finish students, Horn and Veermans [32] argue that "approaches explicitly facilitating CT as a course separate from subject area integration reveal stronger outcomes than those which implicitly embed CT into subject area coursework" (p. 35).

Importantly, some studies have shown that formal or informal education in this area often fail to match the needs of the population. Traxler's study [12] of digital literacy among Palestine refugee communities shows that education programs are "generally not mature or sophisticated" and "seldom concrete or specific" (p. 16). The study also identified a gap between what is offered by educational systems and policies and what the communities need, stressing that curricula need to meet people where they currently are. In addition, in some parts of the world, access to digital technologies or media and information literacy education is significantly lacking compared with resources available in other countries. In this sense, scholars have emphasized the importance of properly considering "local infrastructure, culture, history and even a reworking based on different cultures and environments" in developing educational programs for enhancing media, information, or digital literacies [12].

Given different contexts or environments in which media, information, or digital literacy education is taking place, some programs tailored such education to specific cultures and populations they work with. For example, in developing their digital information literacy program for low-income minority older adults in the United States, Seo, et. al [11] identified a variety of learning styles and literacy levels within their research and incorporated participant feedback into the design and execution of the program. This process helped to adapt offerings for participants and provided materials specific to their interests and needs. Similarly, Techataweewan and Prasertsin [34], working with Thai undergraduate students and educators, identified specific needs for future literacy programs within their country including software skills and understandings of social ethics. In addition, based on empirical research, Pade-Khene [35] developed a four-step digital literacy process to aide in developing engagement initiatives within the socio-economically disadvantaged and rural areas of South Africa.

2.3. Global North-South & Research Questions

In analyzing country characteristics and media, digital and information literacy efforts, we focus on the Global North-South distinction. The term Global North-South became popularized when the Brandt Commission used it in the 1980s as a way of demonstrating how the world was divided into richer countries in the northern hemisphere and poorer countries in the southern hemisphere, though the term no longer has a clear-cut hemisphere definition [36]. Global North-South has been used by scholars and policymakers who prefer the term to "First vs. Second vs. Third World" or "developed vs. developing countries" [36] [37] [39]. In particular, the meaning of Global North-South has evolved over time, expanding beyond borders and recognizing variability within the South or North [36] [39]. Global North countries include the United States, Canada, most European countries, Japan, South Korea, Singapore, Australia, New Zealand, Israel, and Cyprus. The Global South includes countries in Sub-Saharan Africa, Latin America and the Caribbean, Pacific Islands, South Asia, and China [36] [38] [39]. It has long been recognized that there is a significant divide between Global North and Global South in terms of development and wealth, and this divide is associated with disparity in other areas including digital communication infrastructure and information flows [40] [41] [42]. In addition, previous research has shown that a country's position in international telecommunication or Internet networks is associated the country's economic and social developments [43] [44] [45]. According to World System Theory, countries in the world can be divided into core, semi-core, semi-periphery, and periphery [43]. In this sense, it is important to analyze effects of a country's position in the global Internet network on the country's political, economic, and technological characteristics and those characteristics are then associated with the country's media, information and digital literacy education. In this context, we examine the following research questions.

Research Question 1: What is the global Internet connectivity pattern of Global North and South countries?

Research Question 2: How are countries' positions in the global Internet network associated with political, economic, and technological characteristics of the countries?

Research Question 3: How are countries' political, economic, and technological characteristics associated with the complexity of media, information, and digital literacy education in the countries?

Research Question 4: How do Global North and Global South countries differ in terms of media, information, and digital literacy complexity and dimensions emphasized?

3. Methods

To analyze relationships of the country's technological, political, and economic characteristics with media, information, and digital (MID) literacy aspects emphasized in each country, we created a dataset by combining and coding data from several sources. In terms of country characteristics, we analyzed Internet capacity and use statistics (technological); gross national income per capita (economic); and press freedom status and regime type (political). These variables have been widely studied in previous research analyzing information ecosystems around the world [46] [47]. Values for gross national income (GNI), country population (used in per capita calculations), and Internet users per 100 populations come from the World Bank [48]. Measures related to country global Internet connectivity are from International bandwidth capacity data purchased from TeleGeography [53].

For the press freedom status of each country, we used the press freedom index developed by Freedom House, a U.S.-based non-governmental organization for promoting democracy and press [50]. The higher the score, the poorer the press freedom status is. For the regime type, we used measurements developed by Skaaning, Gerring, and Bartusevičius [51] that focuses on freedom around the world and codes country government types into one of seven lexical categories: (i) non-electoral regimes, (ii) one- and no-party regimes, (iii) non-parliamentary constitutional monarchies, (iv) limited multi-party authoritarian regimes, (v) exclusive democracies, (vi) male democracies, and (vii) electoral democracies. Data on regime types of the countries analyzed are from the Institut for Statskundskab [52]. Data on countries' political, economic, and technological characteristic variables are from Year 2017.

In collecting and analyzing data on MID literacy aspects in each country, we took multiple stages including data collection and coding processes involving reviews by experts in the area. This approach is widely used for a comparative study like the current research study [6] [7] [23]. First of all, a group of scholars and practitioners, who are members of international coalitions or organizations in MID areas, identified relevant materials for each country by examining (i) published government documents and reports, (ii) scholarly articles, and (iii) relevant

documents and resources from nongovernmental organizations. In particular, the group examined official documents from the ministry or department of education when a country had such an organization (e.g., Canada, United Kingdom, South Korea). These offices offered a similar point of entry for the team members to begin their search and matched well with the goal of identifying national programs that could affect the largest proportion of its population. However, not every country had a ministry of education office. Qatar, for example, houses their literacy intervention and educational programs within that country's Ministry of Transport and Communications office. South Africa hosts their literacy programs across several government entities including the National Electronic Media Institute of South Africa and the Ikamva National e-Skills Institute. Taking this into account, for all countries analyzed, the team members used the Google Advanced Search and Google Scholar to identify relevant resources. Search keywords used include: "media literacy AND country name"; "information literacy AND country name"; "digital literacy AND country name". The team sought feedback from area experts working in related international organizations when relevant materials were not readily available. This multi-step approach helped ensure that the team members were able to identify relevant documents, programs, and entities across a variety of differing spectrums and in a consistent manner allowing comparisons to be made. MID literacy data on countries are from years 2017-2019.

Once relevant documents for each country were identified, ten researchers and area experts, who study or work in MID literacy areas, examined the country documents and relevant information to code the literacy aspects. The codebook was developed based on UNESCO's Global Media and Information Literacy Assessment and Framework and other studies that offer useful analytical approaches to examining MID literacies [4] [7] [22] [23] [34] [35]. At this point, there is no universally agree-upon evaluation framework in this area [6] [7]. We adopted this framework for our research, as it unifies interrelated areas (information literacy, digital literacy, media literacy, and information communication technology skills) with transversal competencies. In addition, the scope of the UNESCO framework is international and takes into account differences in country infrastructure, resources and Internet access, allowing more nuanced comparative analyses on this topic. In the UNESCO framework, media and information literacy is defined as, "a set of competencies that empowers citizens to access, retrieve, understand, evaluate and use, create, as well as share information and media content in all formats, using various tools, in a critical, ethical and effective way, in order to participate and engage in personal, professional and societal activities." In this study, we focused on six dimensions: (1) critical thinking, (2) privacy/security, (3) ethics, (4) citizenship, (5) communication, and (6) access. The critical thinking dimension covered aspects related to conceptualizing, analyzing, applying, synthesizing, or evaluating information [7] [10] [33]. The privacy/security dimension was about protecting personal data, information, and digital devices, as well as managing digital identity [7] [49]. The ethics dimension was related to demonstrating ethical practices and values in using digital technologies, whereas the citizenship dimension was about understanding human, cultural, and societal issues in technology and engage in citizenship through appropriate digital media [7]. The communication dimension was related to interacting and collaborating through digital technologies, and the access dimension focused on accessibility to technology and the ability to participate in the digital world.

Each coder was assigned to code a set of countries (about 10-20 countries) to cover the 152 countries analyzed for this study. Before analyzing the assigned countries based on the codebook, the coders, who are experts in this area of research, participated in training sessions to further familiarize themselves with the coding categories. Then each coder coded 20% of the countries assigned to them for intercoder reliability testing. The intercoder reliability for each variable was above .85 based on Cohen's Kappa [54]. Once a satisfactory intercoder reliability level was achieved, the coders proceeded with the main coding.

4. Results

4.1. Global North-South Internet Divide (RQ1)

Through our data collection, cleaning, and coding processes, we were able to generate a dataset of 152 countries for which we had values for all variables analyzed. Our findings are summarized in this section along with Figures 1-4 and Tables 1-2. R was used for network analysis and visualization.

Figure 1 shows the global Internet connectivity based on the data between pairs of countries. In Figure 1, country names are identified using World Bank country codes. The circles in red and purple represent countries in Global North and Global South, respectively.

The diameter of the node in Figure 1 is roughly proportional to that country's eigenvector centrality in the network. Eigenvector centrality is a variant of the

PageRank metric originally used by Google. The particular eigenvector centrality score we use in this paper is normalized (can take on values between 0 and 1) and weighted by the bandwidth associated with each connection. A country's eigenvector centrality score is not simply a function of what it does but also a consequence of the direct connections and bandwidth volume of countries with which it is connected [51]. The eigenvector centrality value of a country is higher if that country is itself connected to high-eigenvector centrality nodes and lower if most of its connections are to low-eigenvector centrality countries.

Edges are weighted by the bandwidth capacity of that connection. The width of the edge roughly corresponds to the amount of Internet bandwidth directly connecting the two countries. A country's total International bandwidth capacity refers to a country's maximum international Internet traffic per second summed over all of its shared direct links. As shown in the figure, Global North countries in red are dominant in the global Internet network while Global South countries (purple) are, with few exceptions such as China and Brazil, barely visible in the network.

Internet-related infrastructure plays an essential role in a country's development as more and more economic, political, and cultural activities take place online. Figure 2 shows that countries in Global North tend to have more Internet bandwidth than would be simply predicted by their logged gross national income (GNI) income. Figure 2 shows the positive and roughly linear relationship between bandwidth and GNI, which means the higher the country's GNI, the greater the country's global Internet bandwidth capacity. These variables are logged to reflect their heavy right tail distributions. What we see in the figures suggest significant divides in terms of Internet infrastructure, which have important implications for Global North-South dynamics in many different sectors. Of course, a country's international Internet bandwidth connections are determined by various factors including its geographic location, size of the country, and economic situations. Even taking these factors into account, the inequality is clear. Many would argue that the current distribution of Internet infrastructure is the result of the enormous economic advantages that Global North countries had at the time of the introduction of the Internet [40] [41]. This first-mover advantage has led them to increase their relative proportion of Internet bandwidth to this very day.

4.2. Network Centrality, Characteristics & MID Literacy (RQ2, RQ3 & RQ4)

In terms of media, information, and digital (MID) literacies in the countries, we used a complex index, as this study focuses on which aspects of literacy are covered in the countries' policies and programs rather than the quality of their programs. Previous studies on the topic used similar approaches, as it is difficult to determine quality ranking in analyzing many different countries [6] [7]. As discussed in the Methods section, we focused on the six dimensions: (1) critical thinking, (2) privacy/security, (3) ethics, (4) citizenship, (5) communication, and (6) access. The complexity index is based on the sum of the scores on the six dimensions. In Figure 2, the size of the country bubble corresponds to the level of the MID literacy complexity. Figure 2 shows that Global North countries (in red) tend to show higher MID literacy complexity as well as doing better in terms of global Internet bandwidth and GNI. As shown in Figure 3, a similar pattern is found when we consider the number of Internet users per 100 (user data) rather than global Internet bandwidth (capacity data).

To answer Research Questions 2 and 3, we conducted multiple regression analyses. Specifically, we took a two-step approach. First, we analyzed how a country's position in the global Internet network is associated with its country characteristics (RQ2). As discussed earlier, we used eigenvector centrality as a measure of a node's influence in the network [55]. Our analysis shows that a country's network centrality is significantly related to all five country characteristics variables (Table 1). Specifically, the more central the country is in the global Internet network, the more likely the country has higher GNI per capita ($\beta = .343$, $t = 4.481$, $p < .001$), greater press freedom ($\beta = -.272$, $t = -3.581$, $p < .001$), and more democratic regime type ($\beta = .159$, $t = 2.027$, $p < .05$). As expected, a country's network centrality was highly associated with its Internet bandwidth capacity ($\beta = .948$, $t = 37.86$, $p < .001$) and Internet users per 100 ($\beta = .387$, $t = 4.481$, $p < .001$).

Next, to determine which country characteristics are strongly associated with the country's MID complexity (RQ3), we ran a regression analysis using country characteristics variables as independent variables and the MID complexity as the dependent variable. Specifically, GNI per capita (economic); press freedom score and regime type (political); and Internet users per 100 and global Internet bandwidth (technological) variables were entered as independent variables. As shown in Table 2, the country's Internet users per 100 ($\beta = .275$, $t = 2.758$, $p < .01$) was the most significant predictor of the country's MID complexity, followed by press freedom score ($\beta = -.262$, $t = -2.756$, $p < .01$) and global Internet bandwidth amount ($\beta = .210$, $t = 3.417$, $p < .001$). The country's regime type and GNI per capita were not significantly associated with the MID complexity. It is important to

note that technological characteristics of countries, both in terms of capacity and use, are positively associated with how complex the MID education in the country is. The finding highlights the importance of technological resources for countries' initiatives in MID literacies, as more and more activities take place online. Not only do more activities take place online, but understanding day-to-day activities, including those offline, benefits from understanding the algorithmic nature of much of what structures those activities. The significant relationship between press freedom status on the MID complexity is also important to note. Our results show that countries with lower press freedom scores (more freedom) demonstrate higher levels of the MID complexity.

In Figure 4, the size of the circle is proportional to the level of the MID complexity. An edge indicates a direct connection and the width of an edge is proportional to the shared bandwidth capacity over that connection. Examining Figure 1 and Figure 4, we can identify similarities between countries central in terms of Internet connectivity and countries with higher MID complexity levels. Again, Global North countries dominate central positions in Figure 4 as is the case in Figure 1.

In addition, when we analyzed each of the six dimensions in the country's MID education, we found that the access dimension was often the most salient in Global South countries, as they focus their efforts on providing access to a greater number of citizens in the countries. In comparison, Global North countries tend to go beyond the access dimension by emphasizing critical thinking or privacy issues. Countries with highest complexity scores (e.g., North American and Western European countries) covered ethics and other related aspects as well.

Table 1. Network Centrality (IV) and Country Characteristics (DVs)

Variable	β	*t*	R^2	*F*
Internet capacity	.948***	37.86	.898	1433.9***
Internet users	.387***	5.331	.145	28.419***
GNI per capita	.343***	4.481	.112	20.077***
Press freedom	-.272***	-3.581	.068	12.827***
Regime type	.159*	2.027	0.19	4.109*

Note. *$p < .05$, **$p < .01$, ***$p < .001$. $N = 152$. Lower press freedom scores indicate greater press freedom.

Table 2. Country Characteristics (IVs) and MID Complexity (DV)

Variable	β	*t*	R^2	*F*
Internet capacity	.210***	3.417	.536	33.936***
Internet users	.275**	2.758		
GNI per capita	.142	1.537		
Press freedom	-.262**	-2.756		
Regime type	.107	1.239		

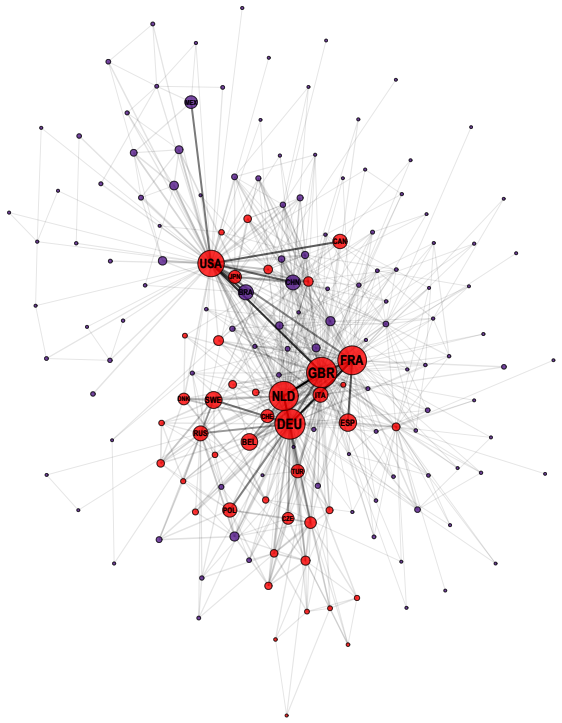

Figure 1. Global Internet Connectivity: Global North (red) vs. Global South (purple)

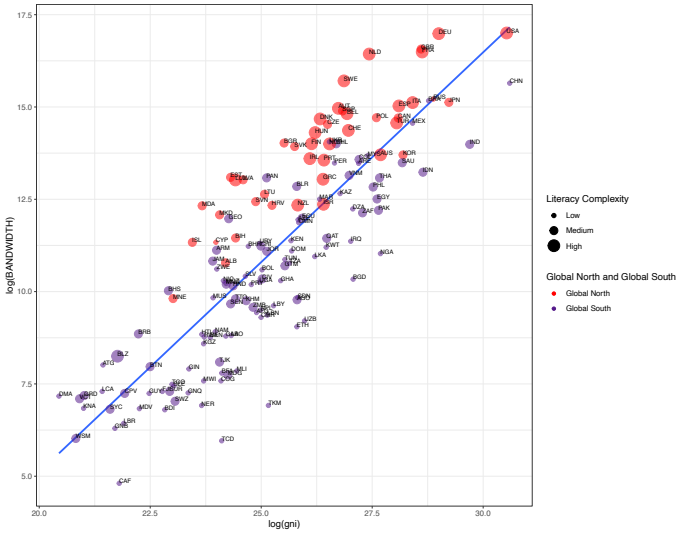

Figure 2. Bandwidth, GNI, and MID Literacy Complexity: Global North (red) vs. Global South (purple)

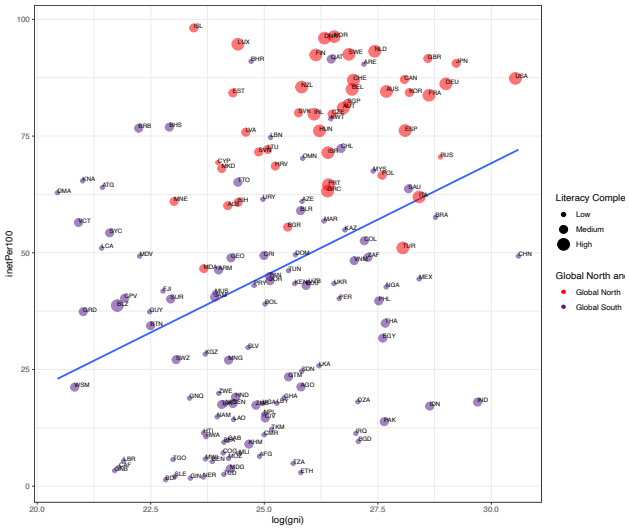

Figure 3. Internet users per 100, GNI, and Media/Information/Digital Literacy Complexity: Global North (red) vs. Global South (purple)

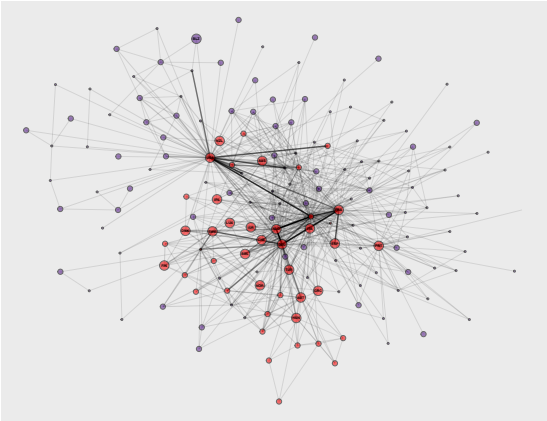

Figure 4. Literacy Complexity: Global North (red) vs. Global South (purple)

5. Conclusion

Based on analyses of country characteristics and media, digital, and information (MID) literacy initiatives in 152 countries, this study offers important scholarly and policy implications in the areas of digital connectivity, MID literacies, misinformation, and international communication. Most of all, the growing recognition and demand for MID literacies as important mechanisms for fighting against misinformation requires comprehensive understandings of MID efforts around the world [7] [13]. In this study, we created a comprehensive dataset covering multiple aspects: Internet capacity and use statistics (technological); gross national income per capita (economic); press freedom status and regime type (political); and MID program dimensions and complexity. The data curation, coding, and analysis procedures used in this study should be helpful for future research in this area.

Our analysis of country characteristics (political, economic, and technological) and MID efforts show that the country's Internet capacity and use (technological) and press freedom status (political) are significant predictors of MID complexity. In addition, our findings show important differences between Global North and Global South countries in terms of MID dimensions and complexity as well as in terms of technological characteristics. Countries in the Global North tend to have higher levels of Internet capacity and use as well as more complex MID programs. That press freedom status is a significant factor in a country's MID programs suggests that efforts to improve a country's press freedom will need to go hand in hand with efforts to improve MID programs in the country. Most of all, these findings highlight the significance of examining relevant country contexts in order to develop nuanced understandings of MID literacy education and offer relevant recommendations for different countries.

Our study offers guidance for future studies that aim to map MID literacy initiatives around the world while taking into account political, economic, and technological conditions of the countries. In this sense, this research contributes to advancing comparative studies, which are currently lacking in the field. Given significant overlap between media literacy, information literacy, and digital literacy, it is also important that future studies develop a solid integrated concept that incorporate the three literacy concepts. A clearly articulated theoretical and operational definitions of such integrated concept will facilitate research in this area.

Practically, our research helps policymakers and practitioners in MID literacy areas better understand the divide between Global North and Global South not only in terms of technological access and use but also comprehensiveness of MID initiatives. As countries are dealing with misinformation problems in essential areas including elections and health, it is important that policymakers and practitioners have a clear and comprehensive understanding of the MID literacy landscape so that they can better identify gaps and allocate resources accordingly. MID literacy education is an important long-term solution to misinformation, as such education informs people's epistemological beliefs which in turn have direct effects on their comprehension of various issues and topics [9] [10]. In particular, research-informed MID programs tailored for particularly vulnerable groups will help inoculate them against the spread of misinformation.

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