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Original Article

Gender and ICTs: The Emerging Reality and Measures for Achieving Equality in Uganda

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ABSTRACT

The gender digital divide remains a challenge in Uganda, where the ICT sector is predominantly male-dominated. This imbalance hinders progress toward gender equality, a key component of Sustainable Development Goal 5. Due to past policy interventions, recent trends suggest shifts in female participation in ICT education and employment. This study examines gender disparities in ICT enrollment and employment, analysing barriers and proposing strategies for inclusivity. Using a mixed-methods approach, the study integrates document analysis, literature review, and consultations with ICT professionals and educators. Student enrollment data from Busitema, Lira and Gulu Universities were analysed to assess gender representation across ICT programs. Findings reveal significant gender imbalances: 83.8% of Computer Science, 79.4% of Computer Engineering, and 62.2% of Information Technology students are male. Additionally, the ICT workforce remains male-dominated (77.9%), particularly in technical and specialised fields. However, a promising trend shows increasing female enrollment in Information Technology education, suggesting a shift in gender participation. The study highlights persistent barriers to gender parity in ICT, such as program design, societal perceptions, and limited female representation in academia. To address these issues, the research proposes targeted interventions, including female-centred ICT curricula, mentorship programs, digital literacy initiatives, and industry-sponsored training opportunities. Hackathon camps and proactive female employment programs are also recommended to enhance career opportunities for women in ICT. Future research should evaluate the long-term impact of these interventions to ensure that increasing female enrollment translates into equitable employment opportunities in Uganda's digital economy.

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INTRODUCTION

Information and Communication Technology (ICT) is one of the fastest-growing sectors globally, offering enhanced services and numerous employment opportunities across multiple disciplines (Sasman, 2013). Despite these benefits, the sector continues to be constrained by significant gender inequalities, particularly in ICT-related careers, academia, and the software industry (Coto & Dirckinck-Holmfeld, 2020; Tiainen & Berki, 2019). These disparities manifest in various ways, including male dominance in top ICT positions (Segovia-Pérez et al., 2020) and ICT-related academic programs (Beyer, 2014). Additionally, the design of software, games, gadgets, and tools tends to reflect male perspectives (Tiainen & Berki, 2019), while ineffective inclusion strategies hinder the full participation of females in educational and professional ICT careers (Vitores & Gil-Juárez, 2016; Roberts, 2016). Furthermore, negative societal attitudes towards women in ICT (Huffman et al., 2013), coupled with a limited number of female role models in academia and professional careers, reduce opportunities for mentorship, networking, and job access for younger girls (Coto & Dirckinck-Holmfeld, 2020; Bartilla & Köppe, 2015; Appianing & Van, 2019; Cicerchia, 2017). These factors collectively contribute to the persistent gender imbalance within the ICT sector, restricting women from fully benefiting from the opportunities the industry offers.

Gender inequalities in ICT are not confined to specific regions; they are prevalent in both developed and developing countries. In developed nations such as the United States, Canada, New Zealand, Australia, Greece, Israel, and Germany, female participation in ICT-related degree programs remains low (Vitores & Gil-Juárez, 2016; Mata et al., 2012). For instance, Segovia-Pérez et al. (2020) report that only 22.5% of ICT degrees in Spain are awarded to females, and just 17.3% of the ICT workforce is female. The situation is equally concerning in developing countries, where significant digital gender gaps exist. Reports indicate that Nigeria (19%), Kenya (18%), Ghana (15%), Vietnam (13%), Tanzania (13%), Pakistan (13%), Palestine Territories (11%), and Uganda (11%) experience notable disparities in ICT participation (Singh, 2017). The gender inequality index in sub-Saharan Africa was 0.572 in 2018, which was higher than that of other regions such as Europe (0.276) and Latin America (0.383) (Ahmed & Madrid-Morales, 2020). These statistics highlight the widespread and persistent nature of gender disparities in ICT, necessitating urgent interventions at national and global levels.

Uganda's situation reflects these broader trends. According to the Global Gender Gap Report of 2019, although women constitute 51% of the country's total population, Uganda's Gender Development Index value was 0.878, with a

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Gender Index Score of 50.6[1]. Compared with 129 countries, Uganda ranked 107th, indicating that ICT development and opportunities primarily favour men. Such disparities hinder women's ability to leverage ICT for personal and professional growth, limiting their potential contributions to technological innovation and economic development.

Recognising the adverse effects of gender inequality in ICT, various stakeholders, including governments, policymakers, development partners, and the private sector, have introduced measures to promote gender balance. Professional bodies such as the Association of Information Systems, the British Computer Society, and the Institute of Electrical and Electronics Engineers (IEEE) have implemented governance and human resource policies to foster equal employment opportunities for women in ICT (Tiainen & Berki, 2019). Additionally, major technology firms such as Google, Microsoft, Facebook, and LinkedIn have launched initiatives aimed at increasing female participation and visibility in the sector. These efforts seek to dismantle barriers that prevent women from thriving in ICT and create a more inclusive digital economy.

In Uganda, several initiatives have been implemented to address gender imbalances in ICT. Makerere University introduced the 1.5-point affirmative action scheme to increase female enrollment in higher education. Additionally, female scholarship initiatives, co-sponsored by Makerere University and the Carnegie Corporation of New York, aim to support women pursuing ICT-related studies. The establishment of a Gender mainstreaming unit at Makerere University and similar programs in other public universities further contribute to addressing gender disparities[2]. The Ugandan government has also developed institutional mechanisms and integrated global and regional commitments on women's rights into national legal and policy frameworks to promote gender balance across sectors. These efforts demonstrate a commitment to bridging the gender gap in ICT and ensuring that women can access equal opportunities in education and employment.

For females to fully benefit from and contribute to the ICT sector, deliberate and sustained interventions are necessary to enhance their participation. Strengthening gender-responsive policies and programs will not only expand employment opportunities for women but also help address the mismatch between job supply and demand in developing countries. Promoting gender inclusivity in ICT is essential for fostering innovation, economic growth, and sustainable development.

This paper seeks to examine the existing evidence on gender disparities in ICT, provide a comprehensive analysis of the underlying causes, and explore potential strategies for fostering gender inclusivity in ICT education and professional development.

LITERATURE REVIEW

One approach to measuring gender digital inclusion is through an analysis of four key dimensions: Enrolment in ICT education; access and use of the internet; representation in the ICT workforce; and participation in ICT innovation.

Female Enrolment in ICT Education

Globally, female enrolment in higher education increased between 1995 and 2017; however, participation in computer-related courses remains disproportionately low compared to males (Alseri et al., 2017). For instance, in the United States, only 14.1% of female students enrolled in Computer Science programs in 2014, and female graduates in the field declined from 19% in 2001 to 14% in 2010. Similarly, in OECD countries, women constituted only 20% of Computer Science students in 2017. The trend persists in Uganda, where female enrolment in Computer Science and Computer Engineering programs stands at 21.8% and 20.6%, respectively.

[1] https://data.em2030.org/wp- content/uploads/2019/05/EM2030_2019_Global_Report_ENG.pdf

[2]. Who we are | gender mainstreaming directorate (mak.ac.ug)

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One of the factors influencing this trend is the perceived difficulty of advanced mathematics and programming courses, which can deter female students from pursuing Computer Science (Powell & Chang, 2016). According to the World Economic Forum's Global Gender Gap Report (2016), a gender gap of 47% exists in ICT education, with 30% of male students graduating in ICT-related programs compared to only 16% of female students. Despite gradual increases in enrolment, there remains a need for targeted interventions to encourage female participation in these programs, such as mentorship initiatives, curriculum modifications, and inclusive teaching strategies.

Access to the Internet

Gender disparities in internet access are more pronounced in less developed countries (Mejova et al., 2018). For instance, in developing nations, approximately 45% of men use the internet compared to 37.5% of women. In the least developed countries, the gap is even wider, with only 14% of women having internet access compared to 21% of men.

In Uganda, the gender gap in internet access is estimated at 25%, which is higher than in countries like South Africa (12%), Lesotho (14%), and Senegal (21%). A 2014 survey by the Uganda Communications Commission found that only 6% of women in Uganda were online, with urban women (21%) lagging significantly behind urban men (61%) in internet usage. Barriers to women's internet access include financial constraints, limited digital skills, social norms favouring male internet usage, and the affordability of broadband connectivity (Antonio & Tuffley, 2014).

To bridge this gap, organisations such as the International Telecommunication Union (ITU) and UNESCO's Broadband Commission have endorsed initiatives to achieve gender parity in broadband access. While progress has been made, disparities persist, particularly in usage patterns. Research suggests that men primarily use the internet for activities such as gaming, online trading, and entertainment, while women use it primarily for communication and social networking (Fatehkia et al., 2018). Addressing these differences requires targeted digital literacy programs and policies promoting equitable internet access.

Representation in ICT Jobs

According to the World Economic Forum (2025), women constitute only 28% of the global STEM workforce and 22% of artificial intelligence (AI) professionals, underscoring the need to upskill more women to reduce bias and shape the future of technology. Although ICT careers offer flexible working conditions that support work-life balance and provide opportunities for career advancement (Powell & Chang, 2016), women continue to be underrepresented in the field.

The technology industry often reflects male-centred design choices due to the limited participation of women in system development. For example, digital assistants such as Apple's Siri and Android's Cortana have been criticised for their gendered representation and inability to respond effectively to certain user requests (Sax et al., 2017). Moreover, gender disparities exist in employment at leading tech firms: women constitute only 17% of Google's engineering workforce, 21% of Pinterest's technical team, 20% of Apple's global engineering division, and 15% of Facebook's workforce (Appianing & Van, 2019). In Silicon Valley, nearly half (45.3%) of the top 150 companies have no women in executive leadership roles.

Gender hierarchies within the ICT sector result in men occupying highly skilled, high-paying positions, while women are concentrated in lower-paying roles such as phone operators, data entry clerks, and administrative staff (Powell & Chang, 2016). Even in leadership positions, only one in four technology and managerial roles are held by women (Cicerchia, 2017). In some regions, such as Singapore, Thailand, and Malaysia, women's participation in ICT careers reaches approximately 50%, whereas in countries like Germany and Denmark, the figure remains

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just above 10% (González-González et al., 2018). To address these disparities, organisations must implement targeted diversity initiatives, mentorship programs, and policies that support female career progression in ICT.

Participation in ICT Innovation

Globally, industries, universities, governments, and non-traditional actors drive ICT innovation (Desta, 2018). However, women's participation in innovation hubs remains low. In Africa, out of 314 tech hubs and incubators, the gender ratio is estimated at 80:20 in favour of men (Desta, 2018). This disparity is influenced by employment patterns, social norms, and cultural barriers that limit women's access to entrepreneurial opportunities and venture capital funding (González-González et al., 2018).

Emerging work models, such as digital mobile lifestyles and virtual workplaces, offer greater flexibility and may provide more opportunities for women in ICT (Kamberidou, 2013). As women increasingly become active users of technology, their participation in innovation can lead to the development of more inclusive and relevant technological solutions that drive economic growth. Policies that support women-led startups, increase access to funding, and foster inclusive innovation ecosystems are critical to narrowing the gender gap in ICT entrepreneurship and leadership.

While some progress has been made toward gender digital inclusion, significant gaps remain in education, internet access, employment, and innovation. Addressing these challenges requires targeted policy interventions, improved digital literacy programs, and inclusive industry practices to ensure equitable participation of women in the digital economy.

METHODOLOGY

This study employed a mixed-methods approach, integrating desk research with empirical data from three public universities in Uganda, namely, Gulu University, Lira University, and Busitema University. The study primarily focused on two of the four key measures for studying gender digital inclusion: (i) enrolment in ICT education and (ii) representation in the ICT workforce. While access to the internet and ICT skills/attitudes are equally important, they were beyond the scope of this study due to data availability constraints. However, future research will seek to explore these aspects in greater detail.

Study Area and Selection Criteria

Gulu University and Lira University, located in northern Uganda, and Busitema University, situated in the eastern region, were selected due to their strategic roles in expanding ICT education in underserved regions. These universities offer a diverse range of ICT-related undergraduate programs, making them ideal for analysing gender trends in enrollment and staffing. Additionally, their geographical representation provides insights into regional variations in ICT uptake in Uganda.

Data Collection and Timeframe

To examine gender disparities in ICT education, this study analysed student enrollment and staffing data from 2008 to 2025. This timeframe was chosen to capture a decade-long trend, allowing for an assessment of policy interventions, social dynamics, and technological advancements that may have influenced gender participation in ICT education.

Enrollment and staffing data were sourced from:

- Official admission and graduation reports.
- Information on academic and support staff from university websites.

These official sources helped maintain the reliability and validity of the data used in the analysis.

ICT Programs Considered

Gulu and Lira Universities currently offer four undergraduate computing programs, while Busitema University offers three. However, for consistency, this study focused on the oldest ICT programs in each institution, ensuring

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comparability over time. The programs selected were:

- Gulu University: Bachelor of Computer Science (BCS), and Bachelor of Information and Communications Technology (BICT).
- Lira University: Bachelor of Computer Science (BCS) and Bachelor of Information and Communication Technology (BICT).
- Busitema University: Bachelor of Science in Computer Engineering (BCE), Bachelor of Science in Computer Science (SCS), and Bachelor of Information Technology (BIT). BCE is offered at the Busitema campus, while SCS and BIT are offered at the Nagongera campus.

Data Analysis Approach

Quantitative data collected were statistically analysed using MS Excel 2019. Both descriptive statistical analysis and comparative trend analysis were conducted to explore gender disparities in ICT education and employment. The key areas of focus included admission, enrollment, dropout, and completion rates for both males and females over 18 years, as well as an analysis of differences in program preferences between male and female students. Additionally, the staffing analysis examined gender disparities in ICT academic staffing by analysing gender representation among faculty members across the three universities. It assessed the proportions of male versus female faculty in core computing programs, highlighting the distribution of academic staff in the field.

Systematic content analysis helped analyse data from desk reviews of official admission reports, graduation reports, and staffing.

Finally, the mixed-method approach allowed integration of results from qualitative analysis with those from quantitative analysis to produce the statistical summaries (percentages, trend lines) presented in the next section.

RESULTS

This study examined gender distribution in ICT undergraduate programs at Gulu University, Lira University, and Busitema University. Data for staffing and student enrollment were obtained from university records, department reports, and the academic registrars' offices of the respective institutions. These data were cross-verified with academic departments to ensure accuracy. The analysis focuses on gender representation among ICT faculty and students across three key programs: Computer Science, Information Technology, and Computer Engineering.

Staffing in ICT programmes

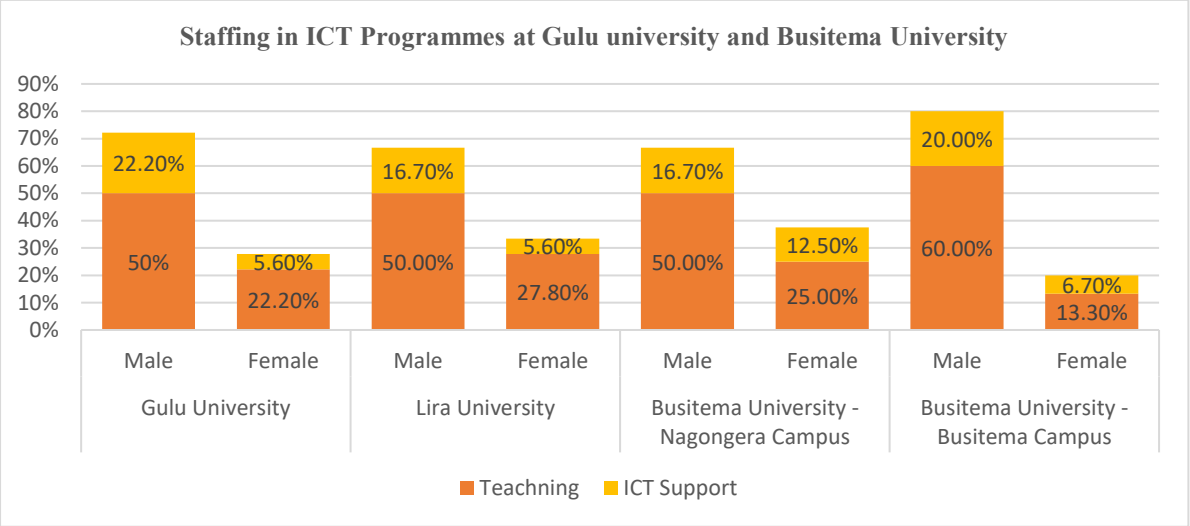
The gender distribution of faculty and support staff in ICT programs at the study universities is presented in Figure 1. The staff data include individuals who teach or support courses in all ICT undergraduate programs offered at each university.

At Gulu University (GU), there were 13 academic staff and 5 support staff in the two ICT undergraduate programs: Bachelor of Computer Science (BCS) and Bachelor of Information and Communications Technology (BICT). Lira University (LU) had a total of 18 (14 academic staff and 4 administrative and support staff) across the two programmes: Bachelor of Computer Science (BCS), and Bachelor of Information and Communication Technology (BICT). Meanwhile, Busitema University (BU) had 23 total staff (17 academic and 6 support staff) across its three ICT programs: Bachelor of Science in Computer Science (SCS), Bachelor of Information Technology (BTI), and Bachelor of Science in Computer Engineering (BCE). Overall, the results indicate that female engagement in ICT academic staffing remains low at both universities. This gender disparity in staffing may have implications for student enrollment, as fewer female role models and mentors are available in ICT disciplines.

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Figure 1: Gender Distribution of Staff in ICT Programmes at the Study Universities



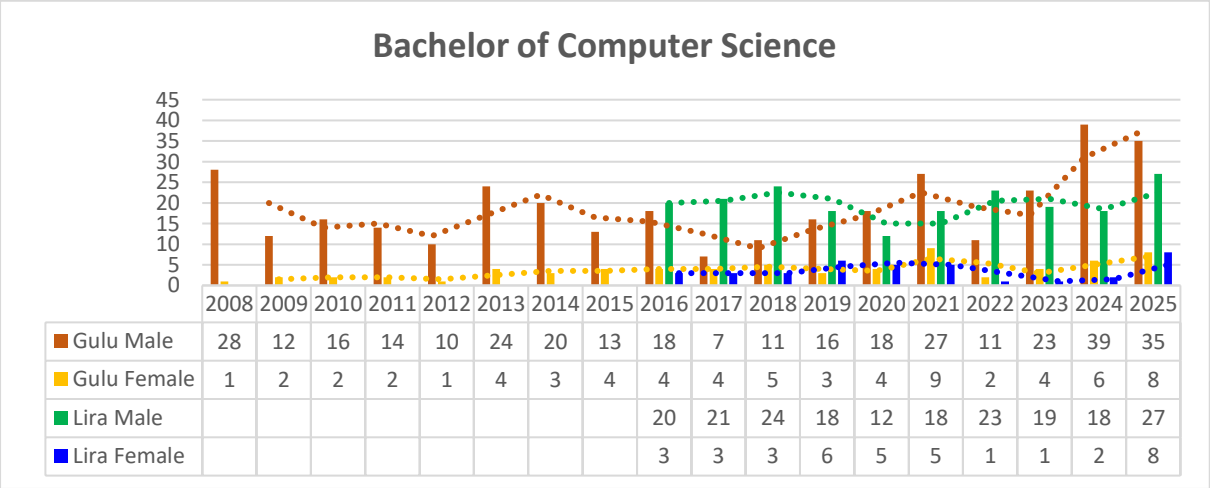
Enrollment in Academic ICT Programmes

The results in this subsection illustrate students' enrollment trends by gender across three academic programs; Bachelor of Computer Science, Bachelor of Information Technology, and Bachelor of Computer Engineering over a decade (2008–2025), highlighting disparities and shifts over time.

Computer Science

Figure 2 presents gender distribution in Bachelor of Computer Science (BCS) at GU (2008–2025) and Bachelor of Computer Science (LCS) at Lira University (2016 cohort – 2025 intake). At GU, male students have consistently outnumbered females in the Computer Science program. However, the gender gap has fluctuated over the years, with notable improvements in female enrollment starting in 2016; however, the gap widened again in 2024 and 2025. At LU, the gender gap has remained high since its inception in 2016; however, noticeable drops in gender disparities were registered only in 2019 and 2020. The observed trend suggests gradual progress in female enrollment in Computer Science, though male dominance remains evident in both universities. This finding is consistent with broader gender digital inclusion challenges in Uganda, where cultural and social barriers may contribute to lower female participation in traditionally male-dominated fields such as Computer Science.

Figure 2: Enrolment in the Computer Science Programme



	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Gulu Male	28	12	16	14	10	24	20	13	18	7	11	16	18	27	11	23	39	35
Gulu Female	1	2	2	2	1	4	3	4	4	4	5	3	4	9	2	4	6	8
Lira Male									20	21	24	18	12	18	23	19	18	27
Lira Female									3	3	3	6	5	5	1	1	2	8

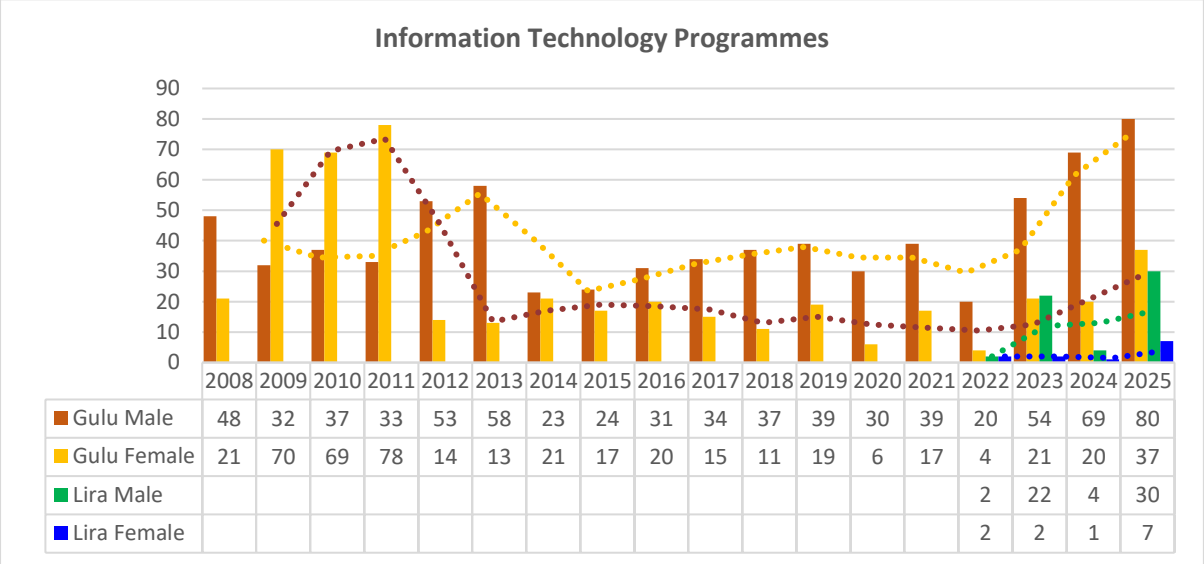
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Information Technology

Figure 3 shows enrolment trends for the Bachelor of Information Technology (BICT) at GU (2008–2025) and LU (2022 cohort- 2025 intake). At GU, male enrollment was higher in most years. However, female students outnumbered males in 2009, 2010, and 2011. Except in 2012, 2013, 2023, 2024, and 2025 (where the gap exceeded 30), the gender gap remained relatively small in most years, with the number of male students more than twice the number of females in only three of eight years. At LU, gender was balanced at programme inception in 2022; however, a very high gender imbalance was recorded in 2023 and 2025. This suggests that gender disparities in ICT programs are not uniform across institutions and that newer programs may attract more balanced enrollment. Newer programs, like LU's IT program, attract more balanced enrolment compared to longer-standing programs, where gender disparities have had time to solidify. Such balanced enrolment trends in newer programs can be encouraging, but the challenge remains to maintain and build upon this balance in the future.

Figure 3: Enrolment in the Information Technology Programme



	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Gulu Male	48	32	37	33	53	58	23	24	31	34	37	39	30	39	20	54	69	80
Gulu Female	21	70	69	78	14	13	21	17	20	15	11	19	6	17	4	21	20	37
Lira Male															2	22	4	30
Lira Female															2	2	1	7

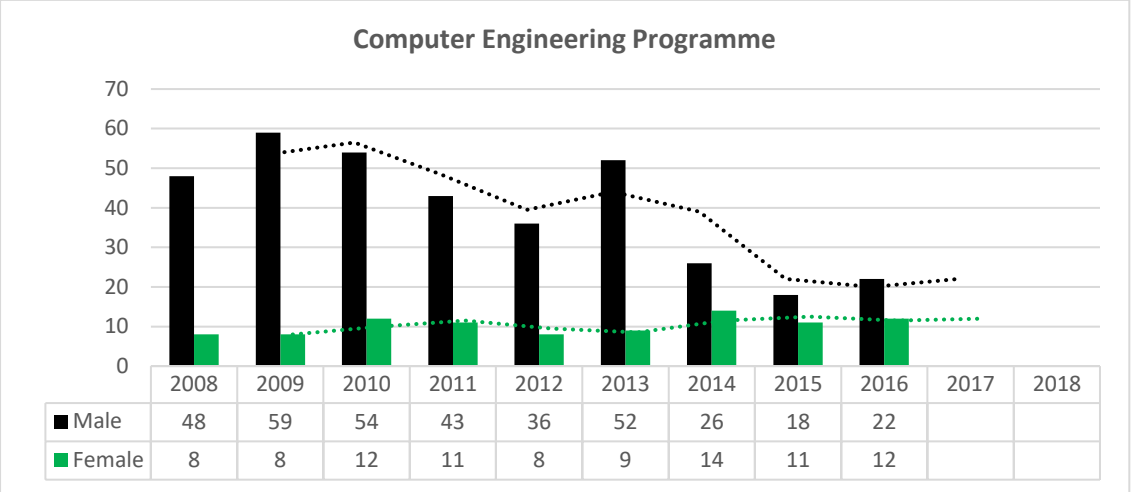
Computer Engineering

Out of the three universities, only BU offers a Bachelor of Science in Computer Engineering (BCE). Figure 4 shows that from 2008 to 2016, male enrollment exceeded female enrollment by more than four times. A notable reduction in the gender gap occurred in 2012, followed by fluctuations in subsequent years (2014 and 2015). Despite an overall decline in total enrollment in the program over time, female enrollment has slightly increased, contributing to a narrowing of the gender gap. The slight improvement in female participation can be seen as a positive development, but the program continues to attract more male students than females. This trend is consistent with global patterns where fields with more technical and mathematically intensive curricula, such as Computer Engineering, tend to have lower female enrollment.

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Figure 4: Enrolment in the Computer Engineering Programme



	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Male	48	59	54	43	36	52	26	18	22		
Female	8	8	12	11	8	9	14	11	12		

These findings highlight persistent gender disparities in ICT education and faculty representation, despite some improvements in female enrollment over time. While BU's Computer Engineering programme recorded lower gender imbalance, GU and LU still experience higher male dominance in ICT programs, particularly in Computer Science. These trends align with broader gender digital inclusion challenges in Uganda. Targeted interventions, such as mentorship programs, scholarships, and gender-sensitive curricula, are essential to bridge the gap and encourage more women to pursue ICT careers.

DISCUSSION

The findings of this study align with previous research that highlights low ICT literacy levels as a major barrier for women in accessing ICT education and careers (Kogiso, 2017; Sandys, 2005). The analysis of enrollment data from Busitema, Lira and Gulu Universities reveals significant gender disparities in ICT bachelor programs, with male students consistently outnumbering female students across all disciplines. Specifically, male students represent 83.8% of Computer Science, 62.2% of Information Technology (IT), and 79.4% of Computer Engineering enrollments, while female enrollment is considerably lower at 16.2%, 37.8%, and 20.6%, respectively. This gender imbalance extends to faculty, where only 22.1% of academic staff in ICT programs are female. These trends underscore systemic barriers that limit women's representation in ICT, hindering their ability to contribute to the creation of digital solutions, content, and applications. A lack of female role models and mentors can also negatively affect female students' engagement with ICT programs and careers. Encouraging young women to pursue ICT fields is crucial for improving female participation in the sector.

Several cultural, social, and economic factors contribute to the gender disparity in ICT programs. In many cultures, including Uganda, traditional gender roles often place women in caregiving and domestic roles, which discourages them from pursuing full-time educational careers in fields like Computer Science and Engineering. Societal expectations reinforce the stereotype that STEM fields are more suited to men, further deterring young women from considering these programs. Additionally, economic barriers, such as the high cost of education, disproportionately affect women, particularly those from disadvantaged backgrounds, limiting their access to ICT education. These cultural and economic challenges require deeper exploration to better understand the barriers preventing women from pursuing ICT degrees.

Cultural perceptions and gender norms continue to shape female participation in ICT education. In Uganda and many other societies, girls are often steered away from STEM fields due to stereotypes associating science and technology with male-

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dominated spaces. Traditional expectations regarding women's roles in caregiving and domestic tasks can also hinder their pursuit of formal education or full-time ICT careers. These cultural factors contribute to the underrepresentation of women in ICT, both in educational settings and professional environments.

Historically, initiatives to empower women in ICT in Uganda focused on radio programs and ICT literacy (Dralega, 2007). However, today's ICT landscape demands more advanced skills, such as proficiency in smartphones, mobile applications, and content creation (Coward, 2018). These advancements necessitate providing women with the skills to compete in the ICT job market, not only as users but also as developers and creators of content. Educational policies should focus on making ICT education accessible and appealing to girls while addressing economic barriers to resources and training.

The study also revealed significant improvement in female enrollment in the Information Technology program, which is less demanding mathematically than more specialised ICT programs. This suggests that women may prefer fields with fewer technical demands, as evidenced by Powell and Chang (2016). Strengthening STEM programs in primary and secondary education can help foster an early interest in mathematics and science among girls, improving their chances of enrolling in ICT programs.

The consequences of gender imbalance in the ICT workforce are far-reaching. In universities, the underrepresentation of women perpetuates a cycle of gender inequality, limiting female role models and mentors for prospective students. In the broader economy, the lack of women in ICT careers restricts their economic opportunities and hinders the development of diverse, innovative digital solutions. The absence of women in key positions in ICT also risks the development of technology that does not fully consider the needs of half of the population. Addressing this imbalance is vital for ensuring a diverse ICT workforce capable of meeting future challenges.

The contrast between BIT enrollment and enrollment in more specialised programs, such as Computer Science and Computer Engineering, raises important questions. Why do women tend to opt for BIT programs, which may be perceived as more versatile or less mathematically demanding? Understanding the factors that contribute to this preference, such as curriculum design or societal pressures, is crucial for improving female enrollment in more specialised ICT programs. Similarly, the underlying cultural, social, and economic factors contributing to male dominance in ICT programs require further exploration. Traditional gender roles and societal expectations often discourage women from pursuing full-time ICT careers, while economic barriers, such as the cost of higher education, disproportionately affect women, particularly those from underprivileged backgrounds. These factors must be explicitly considered to fully understand and address the barriers women face in accessing ICT education.

To bridge the gender gap in ICT education at Busitema, Lira, and Gulu Universities, several practical strategies can be implemented. Establishing university-industry partnerships with ICT firms like MTN Uganda, Airtel Uganda, and the Uganda Communications Commission to facilitate structured internships, mentorship networks, and tech innovation challenges, providing female students with hands-on experience and career guidance. Increasing access to ICT tools through university-sponsored ICT hubs, mobile ICT labs, and scholarship programs for laptops and internet access would enhance digital literacy, particularly for women in rural and underserved areas. Additionally, promoting female-focused ICT programs such as coding boot camps, entrepreneurship initiatives in digital agriculture and e-commerce, and specialised training in Agritech and retail-focused ICT applications to empower women to develop technology-driven solutions that address societal challenges. These initiatives will not only enhance female participation in ICT education but also equip women with the skills and opportunities needed to thrive in the digital economy.

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At the institutional level, there has been a shift towards increased female enrollment in Information Technology programs, supported by various initiatives aimed at encouraging women's participation in ICT education. Gulu University, for example, introduced a 30:70 female-to-male admission ratio in the 2023/2024 academic year to address gender disparities. Lira and Busitema University have partnered with the Forum for African Women Educationalists (FAWE) Uganda to offer financial aid and mentorship to female ICT students. Furthermore, the Mastercard Foundation is also supporting female students at Busitema University. At the national level, the Uganda Communications Commission's UCUSAF program has trained over 3,000 women in digital skills across 20 districts, enhancing their ICT competencies. The government's investment in ICT infrastructure, including the establishment of over 1,000 computer labs and innovation hubs, further aims to improve digital literacy and expand opportunities for women in ICT. Although long-term enrollment data for specific universities is limited, national trends indicate growing emphasis on female participation in ICT education. Continued data collection and analysis will be essential for assessing the impact of these initiatives and refining strategies for further progress.

While female enrollment in ICT programs remains low, studies suggest that women often demonstrate higher completion rates compared to their male counterparts in some regions (Gul, 2020; Ruiz et al., 2017). This suggests that women who enrol may be more committed to completing their studies despite the challenges they face, reflecting resilience and determination. Comparing this study's findings with such trends could provide valuable insights into how gender-specific factors, such as societal expectations and economic barriers, influence female students' persistence and performance in ICT fields.

To overcome the gender imbalance in ICT education, long-term strategies are needed, which goes beyond short-term courses to equip women with essential, long-term skills for thriving in the digital economy. These strategies should include making technology more appealing to girls, partnering with ICT companies to create employment opportunities for female trainees, and promoting female-focused coding and application development programs (Clesensio et al., 2019; Kogiso, 2017). These initiatives must be tailored to different female groups, including those in formal education, out-of-school youth, and marginalised women.

The lack of women in ICT-related fields risks perpetuating gender inequalities and slowing the progress of digital transformation in these areas. This underrepresentation of women in ICT has long-term implications for workforce diversity and innovation. A more diverse ICT workforce fosters creativity and ensures that digital products and services meet a broader range of user needs. Increasing female participation in ICT will not only empower women economically and socially but also help close the gender digital divide.

Finally, as the world continues to transition to a more digital and automated economy, ensuring gender equity in ICT education and the workforce will play a pivotal role in shaping the future of global innovation. Addressing gender disparities in ICT will contribute to inclusive economic growth and ensure a more equitable and sustainable digital transformation.

Research Contribution

This study makes a significant contribution to the ongoing conversation about gender and ICT in Uganda by providing empirical insights into persistent gender disparities in both ICT education and employment. By analysing student enrollment and staffing data from Busitema, Lira, and Gulu Universities, the research highlights significant gender imbalances, with male students consistently outnumbering female students in ICT programs. While male dominance persists, there is a positive trend in increasing female participation, particularly in less technically demanding fields like Information Technology. The study also identifies key barriers to female participation, including cultural stereotypes,

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economic challenges, and the perception that STEM fields are male-dominated. Despite these challenges, the study shows a positive trend of increasing female enrollment in less technically demanding ICT programs, like Information Technology.

The study proposes several interventions to address these disparities, such as female-centred curricula, mentorship programs, and industry partnerships offering internships and career guidance. It also recommends improving access to ICT tools and resources, particularly for women in rural areas. At the institutional level, universities are making efforts to increase female participation through targeted admissions and financial aid initiatives, while national programs like UCUSAF are helping to enhance digital skills among women.

Overall, the research emphasises the importance of continued efforts to promote gender equity in ICT, emphasising that a more diverse ICT workforce leads to greater innovation and better digital solutions. By addressing these disparities, the study aims to empower women and contribute to a more inclusive digital transformation.

Implications for the ICT Workforce

This study highlights key initiatives and trends but acknowledges a significant limitation in the absence of comprehensive longitudinal data on female ICT enrollment at specific universities. Without such data, it becomes challenging to accurately assess the long-term impact of current policies and programs on female participation in ICT education.

Recommendations

To improve gender equality in ICT education, universities will need to revise curricula to make them more inclusive and gender-sensitive. This could involve incorporating content that will highlight the relevance of ICT to societal issues that may resonate with women, as well as offering courses designed to help female students build confidence and competence in technical subjects. Initiatives such as providing scholarships and financial aid for female students, especially in technical fields, will help overcome economic barriers and encourage more women to pursue ICT education.

Establishing mentorship programs that will connect female students with successful women in ICT will also combat the lack of female role models, offering guidance and support as women navigate the challenges of ICT education and careers.

Increasing awareness of ICT careers among young women, particularly in rural and underserved communities, will be equally important. Outreach programs that will raise awareness of ICT education and career opportunities will challenge stereotypes and motivate more women to enrol in ICT programs.

Finally, universities will need to collaborate with ICT companies to offer internships, career development programs, and job placements specifically for female students, providing them with valuable real-world experience and enhancing their prospects for employment in the ICT sector after graduation.

Area for Future Work

Future research should prioritise collecting and analysing detailed enrollment data over extended periods to assess the effectiveness of current initiatives and identify areas for improvement.

Additionally, documenting success stories and tracking the outcomes of mentorship programs will provide valuable insights into the factors that drive female engagement and retention in ICT fields. This research will contribute to a deeper understanding of the barriers and enablers for women in ICT, while also helping refine strategies to create more inclusive and supportive academic environments.

By focusing on evaluating existing policies, documenting success stories, and strengthening mentorship programs, future research can inspire more women to pursue ICT careers and support

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the ongoing efforts to increase female enrollment and engagement in ICT education.

CONCLUSION

Although males remain the dominant gender in ICT in Uganda in both staff and students' enrolment, the results show that the enrolment ratio of females to males has improved to reduce the huge gap that once existed. However, this means that the ICT field will continue to have more males than females competing in the job market in the near future. This gender imbalance could negatively affect ICT programming, adoption, and acceptance to support work routines among the female gender. Besides, triggers like COVID-19, which has propped a sharp rise in the need to digitise all sectors to sustain the continued functioning of government and non-government businesses and transactions are motivators to eliminate the divide and establish gender equality in the field. It is hoped that the gender imbalance trend will change if the gap in male-female enrollment for ICT programmes continues to narrow. This is on the background that the Ministry of Education is advocating for improved ICT training in lower levels of education, which will further narrow the gender gap.

The study highlights the gender disparities that persist in ICT education at Busitema University, Lira University, and Gulu University, with male students continuing to dominate the programs, especially in more technical disciplines like Computer Science and Computer Engineering. While there have been improvements, particularly at Busitema University, there is still a long way to go to achieve gender equity in ICT education. To address these imbalances, universities and other stakeholders need to implement targeted strategies such as gender-sensitive curricula, mentorship programs, scholarships, and outreach initiatives. Ensuring a more gender-balanced ICT education will not only benefit individual women but will also contribute to a more inclusive and diverse ICT workforce, which is essential for the continued growth and innovation in the technology sector.

REFERENCE

Ahmed, S., & Madrid-Morales, D. (2020). Is it still a man's world? Social media news use and gender inequality in online political engagement. Information, Communication & Society, 1-19.

Antonio, A., & Tuffley, D. (2014). The gender digital divide in developing countries. Future Internet, 6(4), 673-687. (PDF) The Gender Digital Divide in Developing Countries. Available from: https://www.researchgate.net/publication/267626150_The_Gender_Digital_Divide_in_Developing_Countries [accessed Jun 05 2021].

Appianing, J., & Van Eck, R. N. (2019). Gender differences in college students' perceptions of technology-related jobs in computer science.

Bartilla, A., & Köppe, C. (2015, July). Awareness seeds for more gender diversity in computer science education. In Proceedings of the 20th European Conference on Pattern Languages of Programs (pp. 1-11).

Beyer, S. (2014). Why are female underrepresented in Computer Science? Gender differences in stereotypes, self-efficacy, values, and interests and predictors of future CS course-taking and grades. Computer Science Education, 24(2-3), 153-192.

Cicerchia, F. (2017). Women and ICTs: an analysis of social, cultural and economic factors relating to gender and ICTs.

Clesensio, T., Florence, N., & Francis, O. (2020). Investing in women as drivers of growth: A gender-based assessment of the Science, Technology and Innovation ecosystem in Uganda. African Journal of Rural Development, 4(2), 261–281.

Coto, M., & Dirckinck-Holmfeld, L. (2020). "Fixing" the Gender Divides in ICT Programs Within Universities. In Handbook of Research on New Dimensions of Gender

 This work is licensed under a Creative Commons Attribution 4.0 International License.

Article DOI: https://doi.org/10.37284/eajit.9.2.5775

Mainstreaming and Female Empowerment (pp. 142-169). IGI Global.

Coward, C. (2018). Digital skills toolkit. International Telecommunication Union.

Desta, T. (2018). ICT Innovations, entrepreneurship and hubs in East Africa: The case of Ethiopia. African Journal of Science, Technology, Innovation and Development, 1–10. doi:10.1080/20421338.2018.1473064

Dralega, C. (2007). Rural women's ICT use in Uganda: Collective action for development. Agenda, 21(71), 42-52.

EM2030_2019_Global_Report_ENG.pdf

Fatehkia, M., Kashyap, R., & Weber, I. (2018). Using Facebook ad data to track the global digital gender gap. World Development, 107, 189–209. doi:10.1016/j.worlddev.2018.03.007

Garcia, D., Kassa, Y. M., Cuevas, A., Cebrian, M., Moro, E., Rahwan, I., & Cuevas, R. (2018). Analysing gender inequality through large-scale Facebook advertising data. Proceedings of the National Academy of Sciences, 115(27), 6958-6963.

González-González, C. S., Iranzo, R. M. G., Paderewski, P., & Padilla-Zea, N. (2018). Gender Design Methods for Engineering, Responsible Innovation and Interaction. Proceedings of the XIX International Conference on Human Computer Interaction - Interacción 2018. doi:10.1145/3233824.3233868

Huffman, A. H., Whetten, J., & Huffman, W. H. (2013). Using technology in higher education: The influence of gender roles on technology self-efficacy. Computers in Human Behavior, 29(4), 1779–1786. doi:10.1016/j.chb.2013.02.012

Jhabvala, R. (2020, December). Overcoming Gender Inequality in the Digital World. In IFIP Joint Working Conference on the Future of Digital Work: The Challenge of Inequality (pp. 13-16). Springer, Cham.

Kamberidou, I. (2013). Women entrepreneurs: 'We cannot have change unless we have men in the room'. Journal of Innovation and Entrepreneurship, 2(1), 1-18.

Kogiso, Mari, Lily Yu, and R. Masuda. (2017). "Advancing Women's Empowerment: ICT Skills for Girls and Women in Southeast Asia."

Lehman, K. J., Sax, L. J., & Zimmerman, H. B. (2016). Women planning to major in computer science: Who are they and what makes them unique?. Computer Science Education, 26(4), 277-298.

Makoza, Frank and Chigona, Wallace. (2013). How Gender is Embedded in the National ICT Policy of Malawi. Proceedings for CPRsouth8/CPRafrica 2013 Conference, Mysore, India, 5-7 September, 2013. pp.1-20. Available at SSRN: https://ssrn.com/abstract=2531859 or http://dx.doi.org/10.2139/ssrn.2531859.

Mariscal, J., Mayne, G., Aneja, U., & Sorgner, A. (2019). Bridging the gender digital gap. Economics, 13(1).

Mata, F. J., Quesada, A., & Raventós, G. M. (2012, October). Gender gap in computer science programs from Costa Rican Public universities. In 2012 XXXVIII Conferencia Latinoamericana En Informatica (CLEI) (pp. 1-7). IEEE

Mejova, Y., Gandhi, H. R., Rafaliya, T. J., Sitapara, M. R., Kashyap, R., & Weber, I. (2018). Measuring Subnational Digital Gender Inequality in India through Gender Gaps in Facebook Use. Proceedings of the 1st ACM SIGCAS Conference on Computing and Sustainable Societies (COMPASS) – COMPASS '18. doi:10.1145/3209811.3212698

Mlambo-Ngcuka, P. (2017). Reshaping the future: Female, girls, ICTs and the SDGs. Fast-forward progress: Leveraging tech to achieve the global goals, 40-44.

 This work is licensed under a Creative Commons Attribution 4.0 International License.

Article DOI: https://doi.org/10.37284/eajit.9.2.5775

Muringi, I., Bukare, A., Atim, S., Boyle, A., & Dauvergne, M. (2015). Final Report for the GEKS Uganda National Assessment (Vol. 256). Brighton, Canada: Women in Global Science and Technology.

POKPAS, C., CRAFFERT, L., VAN AUDENHOVE, L., & MARIEN, I. (2019). Female and ICT in South Africa: Mental Models on Gender and ICT in Marginalised Communities. In 2019 IST-Africa Week Conference (IST-Africa) (pp. 1-8). IEEE.

Powell, C., & Chang, A. M. (2016). Female in tech as a driver for growth in emerging economies. Council on Foreign Relations.

Rashid, A. T. (2016). Digital Inclusion and Social Inequality: Gender Differences in ICT Access and Use in Five Developing Countries. Gender, Technology and Development, 20(3), 306–332. doi:10.1177/0971852416660651

Roberts, T. (2016). Women's Use of Participatory Video Technology to Tackle Gender Inequality in Zambia's ICT Sector. Proceedings of the Eighth International Conference on Information and Communication Technologies and Development – ICTD '16. doi:10.1145/2909609.2909673

Rosenfeld, A., Sina, S., Sarne, D., Avidov, O., & Kraus, S. (2018). A study of WhatsApp usage patterns and prediction models without message content. arXiv preprint arXiv:1802.03393.

Sandys, Edwina. (2005). "Gender Equality and Empowerment of Women through ICT." Women 2000 and Beyond 60–76.

Sasman, L. (2013). ICT creating another social divide. Sister Namibia, 25(2), 20.

Sax, L. J., Lehman, K. J., Jacobs, J. A., Kanny, M. A., Lim, G., Monje-Paulson, L., & Zimmerman, H. B. (2017). Anatomy of an enduring gender gap: The evolution of women's participation in computer science. The Journal of Higher Education, 88(2), 258-293.

Segovia-Pérez, M., Castro Núñez, R. B., Santero Sánchez, R., & Laguna Sánchez, P. (2020). Being a woman in an ICT job: an analysis of the gender pay gap and discrimination in Spain. New Technology, Work and Employment, 35(1), 20-39.

Sey, A., & Hafkin, N. (2019). Taking stock: Data and evidence on gender equality in digital access, skills and leadership. United Nations University, Tokyo.

Singh, S. (2017). Bridging the gender digital divide in developing countries. Journal of Children and Media, 11(2), 245-247.

Tiainen, T., & Berki, E. (2019). The re-production process of gender bias: a case of ICT professors through recruitment in a gender-neutral country. Studies in Higher Education, 44(1), 170-184.

Tømte, C. (2011). Challenging our views on ICT, gender and education. Nordic Journal of Digital Literacy, 6(special_issue), 309-324.

Vitores, A., & Gil-Juárez, A. (2016). The trouble with 'female in computing': a critical examination of the deployment of research on the gender gap in computer science. Journal of Gender Studies, 25(6), 666-680.

Wagner, C., Garcia, D., Jadidi, M., & Strohmaier, M. (2015, April). It's a man's Wikipedia? Assessing gender inequality in an online encyclopedia. In Proceedings of the International AAAI Conference on Web and Social Media (Vol. 9, No. 1).

Wennberg, P., Gunnarsson, E., Källhammer, E., & Teräs, L. (2013). Innovation and gender: how to boost and measure change. Plan Sju kommunikation AB.

Williams, L. D., & Artzberger, G. H. (2019). Developing female as ICT users: a miniature scoping review of gender and ICTs for development. Gender, Technology and Development, 23(3), 234-256.

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Article DOI: https://doi.org/10.37284/eajit.9.2.5775

World Economic Forum (WEF) Report, (2016), The Future of Jobs: Employment, Skills and Workforce Strategy for the Fourth Industrial Revolution, Geneva, Switzerland

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