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Understanding Evolution and Progress Towards Academic Maturity - A Review of Ten Years of ICT4D Research

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Abstract: ICT4D researchers have since the inception of the field engaged in analyzing its emerging contours, as well as continuously pursued critical self-examination to support academic growth. This paper aims to contribute to a better understanding of the outcome of the efforts of pushing a relatively young field forward, by analyzing the field's level of academic maturity. Through a literature review of ten years of ICT4D research (2011-2020), which include all papers published in ITD, ITID and EJISDC as well as all ICT4D papers published in the Senior Scholars' Basket of 8 Journals, the study observes that ICT4D research fulfills several criteria associated with academic maturity. Furthermore, the results indicates that the most cited ICT4D research output is actively contributing to disciplines outside these reference disciplines of IS and development studies, suggesting that ICT4D research has established itself beyond the reference disciplines. The later constitutes a key milestone in disciplinary development.

Keywords: ICT4D, disciplinary growth, academic maturity, literature review

1. Introduction

The use of information and communication technology for development (ICT4D) has a history dating back to the late 80s [1, 2]. The role of ICTs in development, and understanding of ICTs potential contribution to development, has both expanded and shifted over time [1, 3]. Although the general trend has been expansion; the field has also been questioned at its core, that is, whether ICT4D was one of many fads in development practices and research [4]. Early challenges was a direct result of numerous reports of failed ICT4D projects in developing contexts [5, 6]. By the early 2000s the existential debates appear to have settled, and since then the ICT4D field appears to have reconciled with its dual nature as a 'pracademic' endeavor, that is spanning the "somewhat ethereal world of academia as scholars and the pragmatic world of practice [7], resulting in an orientation towards understanding how, rather than if, ICTs can support development [8-11].

Gomez [12] argued in 2013 that the "magnitude of the growth in the field of ICTD is unquestionable" (p. 2), and justifies the position by the number of new ICT4D journals and the hundreds of conferences that have taken place in the first decade of the millennium. Notions of growth and evolution is supported in one of the larger systematics reviews of the field, which sets out to understand the content characteristics of the ICTD field in the first decade of the millennium using a multi- variable research design [12]. Gomez's identifies multiple upward trends such as research output levels, contribution to design, policy or theory including formulation, testing and validation of theory.

Several studies have sought to contribute to a better understanding of the field's evolution over time, including critical self- examination concerning the field's research gaps [2, 13, 14]. Areas of neglect include, but is not limited to; lack of theoretical foundation and theoretical maturity [12]; paradigmatic assumption and influences [15], as well as engagement with critical theory including post-colonial theory [16-19]; failure to engage with ICTs impact on gender equality [20]; lack of explicit engagement and failure to unpack "development" as well as outline ICTs role in relation to development goals [21, 22]. Schelenz and Pawelec [23] offers a comprehensive summary of critiques regarding ICT4D research output and contribution to practice, and tries to support ICT4D academics to confront and overcome areas of critique, as well as remind the community of its history as a discipline with an ambition to support practice. To sum up, the community of ICT4D researchers have since the inception of the field, engaged in analysis of not only the field's emerging contours, in terms of thematic, geographical, methodological orientation, but also continuously pursued critical self-examination to support further growth. In line with this tradition, this paper aims to contribute to a better understanding of the outcome of these efforts of pushing the field forward., but does so from a slightly different vantage

point than previous work. This paper hope to contribute to a better understanding of evolution over time by engaging in an analysis of the field’s level academic maturity.

Serenko and Bontis [24] argues that academic maturity rests on the fulfillment of a number of criteria, such as having an established set of journals, regular academic meetings, distinct subject matter, major scholars, growing body of knowledge, recognized learned societies or special interest groups, well-developed networking channels, a place in the academic teaching curriculum, and recognition of scholarly output, as well as an impact on other disciplines. Wade et al. [25] highlight the importance of making a substantial contribution theoretically and methodologically to other fields to achieve the status of being a reference discipline. A reference discipline is thus a well-established and recognized academic domain that supports other disciplines’ intellectual endeavors [26]. Wade et al. [25] argued that the IS field, at the time had only left “a modest imprint”, it cannot be regarded as reference discipline. Although the listed criteria makes no reference to the importance of academic environments to support high quality and impactful research, there is reason to believe that critical mass both in terms of intellectual capacity and other resources, are important factors. Especially in fields with strong international competition, it has been noted that concentration of resources including intellectual capability, is an important factor in achieving internationally recognized research [27]. Furthermore, the existence of critical mass and formalized research groups, appear to be conducive to the quality of individual researchers’ output [28], and international visibility, which can be seen as a proxy for research quality [29]. We also interpret it as a sign of institutional recognition of the discipline.

To better understand the ICT4D field’s evolution and level of maturity, this paper explores factors associated with academic maturity. Through a review of the past ten years of ICT4D research output, this paper analyzes:

- The existence of major scholars, where major is understood as number of publications and citations.
- The existence of academic ICT4D hubs, i.e., congregation of academic production to specific spaces.
- The existence of key works, understood as frequently cited works.
- The degree of impact on disciplines outside the two reference disciplines IS and development studies, i.e., to what degree is ICT4D research being recognized by other academic disciplines.

2. Method

For the review of the literature we followed the guidelines of journal selection by Webster and Watson [30]. Similar to Gomez [12] we selected the three top ranked peer-reviewed journals from our field of study, ICT4D. Gomez [12] also included two additional ICT4D focused journals, as well as two ICT4D conferences. In this study we supplemented the top ranking ICT4D journals with the top journals in one of our reference fields, IS. The top three ICT4D journals was selected based on Heeks ranking [31]¹ and the top IS journals selected are the Senior Scholars' Basket of 8 Journals (SSB8J) [32]. The literature review thus comprised of 11 journals in total. For the three ICT4D journals EJISDC, ITD and ITID all papers between 2011-2020 (except for editorials and book reviews) were included. For articles from the SSB8J a slightly more purposeful sample stagey was applied, which entailed identifying and including only the articles which had a clear focus on ICT4D. The sample processes included a search using the keywords: ‘ICT4D’, ‘ICTD’, ‘Developing countries’ and ‘Developing country’. In a second step all abstracts were read to determine if the paper had an ICT4D focus or if ICT4D was cursorily mentioned. We acknowledge that ICT4D is an interdisciplinary field, and scholars publish in a vast number of different outlets, including other IS journals not included in this study. There are for example several regionally oriented ICT4D journals focusing on Africa and Asia that are not included. Similiar to Gomez [12], we choose to exclude region- specific journals. With the aforementioned limitations, we may have missed some highly cited ICT4D papers, which can have had an impact on the results. We recommend that development studies journals, as well as high-ranking conferences, should be included in future studies. A total of 862 papers were included in this study. See table 1 for selected journals and number of papers.

Table 1: Selected journal and number of papers

Journal	Number of papers	Average no. of citations
EJISDC	406	17,16
ITD	267	30,41
ITID	133	29,91
ISJ	19	
JIT	13	
JAIS	8	
MISQ	6	
EJIS	4	
JSIS	3	
ISR	2	
JMIS	1	
SSB8J combined	56	54,88

¹ Note that Information Technologies & International Development Journal are currently not publishing any papers. Last issue was in 2020.

With almost half of the articles (47%) EJISDC dominate the material in terms of number of published ICT4D papers 2011-2020. Only 6.5% were published in the SSB8J. After identification all papers were coded on:

- Journal name, year published, volume and issue.
- Title of the paper.
- Authors (both main and co-authors).
- Author university. (If author was affiliated with multiple universities, only the first listed university was noted).
- The country of the authors' university affiliation.
- Number of citations for each paper

Google Scholar was used to determine the number of citations as it provides the most comprehensive citation data [33]. The number of citations was collected during one week in September 2020. Since recently published papers have had a shorter time to accumulate citations, we acknowledge that the mapping is skewed in favor of older papers. The entire statistical analysis was done in excel using Pivot tables, and we only use descriptive statistic in the paper.

To explore the field's impact on other disciplines, we mapped citation patterns for the ten most cited papers. A citation identifies the "researchers whose concepts, theories, methods, equipment, and so on, inspired or were used by the author" [34]. Furthermore, a citation of a particular text, reflects the merits of it, that is, its quality, significance, and/or impact [34]. The study approached citations in similar fashion to Wade et al. [25], who explains the rationale behind citation analysis as "[c]itations represent a means by which knowledge is transferred among scholars both within a field and between fields. Citations are the foundational building blocks upon which scientific traditions are formed and advanced" (p. 249). Given the study's sample size of 862 articles, where each item has accumulated numerous citations, in combination with the study's resources limitations; the citation analysis only included the top ten most cited articles. This purposeful sampling technique, was motivated by the top ten constituting the field's most substantial output. Scientometrics considers a set of the most influential articles as a valid sample- procedure [35]. For each of the top ten cited articles, the citations we assessed and coded as either: a) ICT4D, b) IS, c) Development, or d) Other, i.e., outside the two reference disciplines, such as business administration, political science or pedagogy etc. During the analysis we reviewed each source that we were not immediately able to place within a specific field. The review entailed examining the journal's aims and scope statement, followed by an examination of the papers the journal typically published. Sources in languages other than English, German, French, Spanish and Portuguese, were excluded due the authors' language limitations to assess the source's disciplinary home. Furthermore, to limit the risk for interpretational error in the coding, all items were coded by both authors.

3. Findings

Several studies have ambitiously analyzed the ICT4D field's growth since the start of the millennium, and concluding it to be a diverse, multi-disciplinary and multi-stakeholder academic field [2, 19, 23]. This study sought to contribute to the understanding of the ICT4D field's evolution, using a different lens than most previous studies.

3.1. Existence of major scholars

The existence of major scholars is one criteria to measure disciplinary maturity. Table 2 shows the authors that has published the most papers as main author between 2011-2020. Although one author stands out, Gomez, it is difficult to argue that there is a group of leading scholars. Rather there is a spread of authors publishing in the field (there are 1606 different authors that are either main or co-author of the papers included in the study). With the study including all papers for ten years, one could argue that most of leading authors publishes relatively little. The productivity measure would, of course, change had we included more journals and conferences such as IFIP WG 9.4, ICTD and SIG GlobDev.

The results could also indicate a diverse community where many contribute. Only Agder University and University of Cape Town appear twice in the list for the 14 most published researchers. The results indicate that the field is still a rather male- dominated domain with only three of the 14 most cited authors being female.

Table 2: Most published authors (as main author)

Main author	No. of papers	University	Gender
Gomez, Ricardo.	10	University of Washington	Male
Thapa, Devinder.	7	Agder University	Male
Heeks, Richard.	7	University of Manchester	Male
Samoilenko, Sergey.	6	Virginia Union University	Male
Bello-Bravo, Julia.	6	Michigan State University	Female
Venkatesh, Viswanath.	5	University of Arkansas	Male
Etoundi, Roger Atsa	5	University of Yaoundé	Male
Winley, Graham Kenneth.	4	Assumption University	Male
Mariscal, Judith.	4	Centro de Investigación y Docencia Económicas	Female

Mooketsi, Bojelo E.	4	University of Cape Town	Female
Sein, Maung K.	4	Agder University	Male
Bankole, Felix O.	4	University of Cape Town	Male
Duffett, Rodney.	4	Cape Peninsula University of Technology	Male
Effah, John.	4	University of Ghana Business School	Male
18 authors with 3 publications			

Looking at the SSB8J specifically (see table 3) we see that 16 authors have published 2 or more papers from 2011 to 2020. Comparing total number of publications with publications in SSB8J we see that some authors, such as Venkatesh, Sykes and Myers only publish in SSB8J whereas e.g., Gomez only publish in the ICT4D specific journals. We also see that some of the most published overall, such as Heeks and Thapa, publish in both the SSB8J and the ICT4D specific journals.

Table 3: Most published authors in SSB8J (as main- or co-author)

Author	No. of papers
Venkatesh, Viswanath.	5
Sykes, Tracy Ann.	5
Heeks, Richard.	3
Rai, Arun.	3
Karanasios, Stan.	3
Soekijad, Maura.	2
Sandeep, M. S.	2
Myers, Michael D.	2
Cui, Lili.	2
Slavova, Mira.	2
Cui, Miao.	2
Thapa, Devinder.	2
Ferguson, Julie.	2
Pan, Shan L.	2
Ravishankar, M. N.	2
Avgerou, Chrisanthi.	2

Table 4 shows the most cited authors (as both main and co-authors) and average number of citations per paper. Not surprisingly, considering he is the most productive in terms of number of publications, Gomez has the greatest number of citations with 529. On second place it is a “tie” between Venkatesh and Sykes. For all their papers they are main author (Venkatesh) and co-author (Sykes) which explains their identical numbers. Interesting though, while they only have 5 published papers, they have almost as many total numbers of citations as Gomez. As mentioned all of Gomez papers are published in the three dedicated ICT4D journals, whereas Venkatesh and Sykes papers are published in the SSB8J (3 in MISQ, 1 in ISJ and 1 in ISR). Papers publishing in the SSB8J have a higher average number of citations (see table 1). Similar to most published authors, most of the most cited authors are male (17 of 20).

When combining data for lead and co-authorship, number of total citations, as well as average number of citations per paper (table 4); it become even more difficult to argue a group of leading scholars. Is an individual a leading scholar based on the number of papers published? Or the total number of citations accumulated? The ICT4D field has a group of six scholars that have accumulated 400 or more citations, but with a range of 5-16 papers contributing to the overall score.

Table 4: Most cited authors (as main- and co-author)

Author	No. of citations	No. of papers (main- and co-author)	Avg. citations	Gender
Gomez, Ricardo.	529	16	33,06	Male
Venkatesh, Viswanath.	518	5	103,60	Male
Sykes, Tracy Ann.	518	5	103,60	Female
Heeks, Richard.	488	13	37,54	Male
Brown, Irwin.	442	9	49,11	Male
Thapa, Devinder.	417	11	37,91	Male
Sæbo, Øystein.	331	8	41,38	Male
Bankole, Felix O.	317	4	79,25	Male
Pather, Shaun.	302	6	50,33	Male
Sein, Maung K.	295	7	42,14	Male
Walsham, Geoff.	290	3	96,67	Male
Graham, Mark.	284	5	56,80	Male

Smith, Matthew L.	276	3	92,00	Male
Blumenstock, Joshua E.	265	2	132,50	Male
Wyche, Susan.	241	3	80,33	Female
Zainudeen, Ayesha.	240	3	80,00	Female
Carmody, Padraig.	232	2	116,00	Male
Venkatraman, Srinivasan.	219	1	219,00	Male
Chib, Arul.	218	7	31,14	Male
Furuholt, Bjørn.	211	3	70,33	Male

3.2. The existence of ICT4D hubs

With established research groups likely to be a conducive environmental factor to research output and quality, as well as a sign of institutional recognition of the discipline; the study sought to explore the existence of research hubs. Table 5 shows the 21 most published universities. There appear to be two main hubs, that in terms of number of peer reviewed articles, are more productive than other environments. These academic environments are University of Cape Town and University of Oslo.

Table 5: Affiliation for main authors

University	No. of published papers	Country
University of Cape Town	35	South Africa
University of Oslo	31	Norway
University of Washington	19	United States
University of South Africa	17	South Africa
Cape Peninsula University of Technology	16	South Africa
University of Manchester	14	United Kingdom
University of Agder	13	Norway
University of London	12	United Kingdom
London School of Economics & Political Science	10	United Kingdom
University of Yaoundé	10	Cameroon
Örebro University	9	Sweden
Assumption University	8	Thailand
Michigan State University	8	United States
University of the West Indies	8	Jamaica
Nanyang Technological University	8	Singapore
University of Fort Hare	8	South Africa
University of Ghana Business School	8	Ghana
University of Pretoria	7	South Africa
University of Oxford	7	United Kingdom
Rhodes University	7	South Africa
University of the Western Cape	7	South Africa

3.3. ICT4D key work

A key feature of a mature research discipline is the existence of key works, defined here as frequently cited works. The ICT4D field appear to have a set of key works that are widely cited and most likely to impact the conversations within ICT4D community. Not surprisingly, most (17) of the papers in the list are from 2011-2015. The most cited paper is however from 2017 and published in ITD. No particular academic environment dominate, which could be interpreted as a there are several institutions that provide the right conditions for impactful work to be produced.

Table 6: 20 Most cited papers

Journal	Year	Title	Author	Citations	Affiliation of authors
ITD	2017	ICT4D research: reflections on history and future agenda	Walsham, G.	264	University of Cambridge
ISJ	2014	Understanding e-Government portal use in rural India: role of demographic and personality characteristics	Venkatesh, V., Sykes, T. A., & Venkatraman, S	219	University of Arkansas, Coastal Carolina University
ISJ	2011	A preliminary study of ecommerce adoption in developing countries	Datta, P.	209	Kent State University
MISQ	2015	Bridging the Service Divide Through Digitally Enabled Service Innovations:	Srivastava, S. C., & Shainesh, G.	198	HEC, Paris, Indian institute of

		Evidence from Indian Healthcare Service Providers			management, Bangalore
ITD	2015	An Empirical Study of Factors Affecting E-Commerce Adoption among Small- and Medium-Sized Enterprises in a Developing Country: Evidence from Malaysia	Ahmad, S. Z., Abu Bakar, A. R., Faziharudean, T. M., & Mohamad Zaki, K. A.	197	Abu Dhabi University, Prince Sultan University, University of Malaya,
ITID	2011	Mobile Phones and Expanding Human Capabilities	Smith, M. L., Spence, R., & Rashid, A. T	191	International Development Research Centre – Ottawa, Economic and Social Development Affiliates – Toronto
EJISDC	2012	ICT Evaluation: Are We Asking the Right Questions?	Gomez, R., & Pather, S.	177	University of Washington, Cape Peninsula University of Technology
ITD	2016	Why Don't Farmers Use Cell Phones to Access Market Prices? Technology Affordances and Barriers to Market Information Services Adoption in Rural Kenya	Wyche, S., & Steinfield, C.	177	Michigan State University
EJIS	2012	The impact of IT-business strategic alignment on firm performance in a developing country setting: exploring moderating roles of environmental uncertainty and strategic orientation	Yayla, A. A., & Hu, Q.	175	Binghamton University, Iowa state university
ITID	2013	Considering Failure: Eight Years of ITID Research	Dodson, L. L., Sterling, S. R., & Bennett, J. K.	170*	University of Colorado
ITD	2013	Telecommunications development and economic growth in Africa	Chavula, H. K.	167	Economic Commission for Africa
ISR	2013	Digital Divide Initiative Success in Developing Countries: A Longitudinal Field Study in a Village in India	Venkatesh, V., & Sykes, T. A.	166	University of Arkansas
EJISDC	2011	Mobile Banking Adoption in Nigeria	Bankole, F. O., Bankole, O. O., & Brown, I.	161	University of Cape Town
JMIS	2013	Information Technology and Productivity in Developed and Developing Countries	Dedrick, J., Kraemer, K. L., & Shih, E.	161	Syracuse University, University of California, Sungkyunkwan University
ITD	2012	Youth, mobility and mobile phones in Africa: findings from a three-country study	Porter, G., Hampshire, K., Abane, A., Munthali, A., Robson, E., Mashiri, M., & Tanle, A.	156	Durham University, University of Cape Coast, University of Malawi,
ITD	2017	Increasing collaboration and participation in smart city governance: a cross-case analysis of smart city initiatives	Viale Pereira, G., Cunha, M. A., Lampoltshammer, T. J., Parycek, P., & Testa, M. G.	150	Danube University, Krems Pontifical Catholic University of Rio Grande do Sul
ITD	2012	Inferring patterns of internal migration from mobile phone call records: evidence from Rwanda	Blumenstock, J. E.	146	University of California
ITID	2011	Social Influence in Mobile Phone Adoption: Evidence from the Bottom of the Pyramid in Emerging Asia	De Silva, H., Ratnadiwakara, D., & Zainudeen, A.	144	LIRNEasia, Louisiana State University
EJISDC	2011	The Developmental Contribution From Mobile Phones Across the Agricultural Value Chain in Rural Africa	Furuholt, B., & Matotay, E	133	University of Agder, Mzumbe University
ITID	2013	Emergent Practices Around CGNet Swara: A Voice Forum for Citizen Journalism in Rural India	Mudliar, P., Donner, J., & Thies, W.	132*	University of Texas, Microsoft Research India

*Google scholars do not separate the citations from the journal ITID and the conference proceedings the paper was first published in.

3.4. Impact outside the reference disciplines of IS and development studies

Does ICT4D research draw primarily intra-disciplinary citations from the fields of IS and development, or other disciplines? Wade et al [25] describe a 80/20 rule in his study of twelve years of published IS management research, where around 80% of citations are intra-disciplinary citations, and the rest come from other fields.

The citation analysis (see table 7) of the ten most influential articles indicate that ICT4D key works often, but not always surpass the 80/20 rule. The analysis indicates that several of the most cited articles have been successful in reaching an audience outside the two reference disciplines of IS and development studies. A closer look does however indicate that it is primarily research that focus on trade, business- intelligence and administration, that have been particularly successful in drawing citations outside the two reference disciplines.

Table 7: Citation analysis of the ten most cited papers

Journal	Title	ICT4D	IS	Development	Other
ITD	ICT4D research: reflections on history and future agenda	47,8%	28,4%	11,7%	12,1%
ISJ	Understanding e-Government portal use in rural India: role of demographic and personality characteristics	28,8%	43,4%	0,5%	27,4%
ISJ	A preliminary study of ecommerce adoption in developing countries	29,7%	44,0%	0,5%	25,8%
MISQ	Bridging the Service Divide Through Digitally Enabled Service Innovations: Evidence from Indian Healthcare Service Providers	17,7%	47,5%	4,5%	30,3%
ITD	An Empirical Study of Factors Affecting E-Commerce Adoption among Small- and Medium-Sized Enterprises in a Developing Country: Evidence from Malaysia	32,0%	18,3%	4,0%	45,7%
ITID	Mobile Phones and Expanding Human Capabilities	31,5%	25,0%	9,0%	34,5%
EJISDC	ICT Evaluation: Are We Asking the Right Questions?	41,2%	31,1%	4,5%	23,2%
ITD	Why Don't Farmers Use Cell Phones to Access Market Prices? Technology Affordances and Barriers to Market Information Services Adoption in Rural Kenya	35,6%	18,6%	8,5%	37,3%
EJIS	The impact of IT-business strategic alignment on firm performance in a developing country setting: exploring moderating roles of environmental uncertainty and strategic orientation	20,6%	42,3%	0%	37,1%
ITID	Considering Failure: Eight Years of ITID Research	46,5%	31,7%	8,8%	13,0%

4. Discussion and conclusion

This study sought to contribute to the growing body of research on the ICT4D field's evolution. We believe this study complements some of the previous work most notably, Gomez [12] and Walsham [2], as well as Andersson and Hatakka [36]. We used a slightly different lens than most previous studies that primarily engaged with analyzing the field's key foci, methodological and theoretical approaches, as well as geographical orientation and implication for policy. Academic maturity can be measured based on a number of criteria such as an established set of journals and conferences, major scholars, a growing body of knowledge, well-developed networking channels, a place in the academic teaching curriculum, recognition of scholarly output [24], as well as an impact on other disciplines [25]. In this paper we explored some of the criteria for academic maturity.

The existence of major scholars - the study shows that the field has several established scholars that both have a relatively high production of papers and citations. We can also see that ICT4D research are welcome, and published, in the top IS journals. Hence, there are indications that the field has leading scholars, but the findings are inconclusive, with the configuration of a leading group is difficult to ascertain.

The existence of ICT4D hubs – Our study also reveals that there are number of universities with a high production of ICT4D research. As mentioned, the existence of critical mass and formalized research groups, appear to be conducive to the quality of individual researchers' output [28]. Albeit there exist research environments who are numerically productive, i.e., are responsible for a relatively high number of papers; these research environments were not responsible for any of the top ten most cited work, University of Cape Town, has one paper on the top twenty list. Looking at the list of most published universities it is also apparent there are 4 countries that produces most ICT4D research, South Africa, UK, Norway and the USA.

Key works – in our study we also list the top 20 cited papers from 2011-2020. Of the top 20 cited papers there are only two authors that appear more than once -Venkatesh and Sykes (as main- and co-authors of the same papers) - with two papers on the list. When looking at where the papers are published, while the SSB8J papers only represent 6.5% of the papers in our dataset, six of the 20 most cited papers are from SSB8J, including 3 of the top five cited papers.

Impact outside of the reference disciplines - The study's citations analysis indicate that ICT4D research is being recognized beyond its reference disciplines. Some sub-areas are clearly contributing to and influencing other academic

disciplines. Following the 80/20 rule [25] we see that eight of the top ten cited papers have more than 20% of the citations outside of the reference fields of ICT4D. For one paper [37], as much as 45,7% of the citations are outside of ICT4D or its reference fields. While, the citation-patterns can be interpreted as a sign of recognition from other disciplines, further bibliometric studies are required to establish to what degree ICT4D research reciprocates and itself embraces pluralism and transdisciplinarity beyond its reference disciplines. Future work should thus explore to what degree the ICT4D field, is defined by an intellectual ideal of a never-ending cycle of wide engagement with other fields, and learning from other disciplines to ensure both continuous relevance of output and rigour [38].

Other criteria for a mature field, not explicitly studied in this paper, would also indicate that the ICT4D field has come a long way since the early 2000s. ICT4D has its own specialized journals (e.g., ITD and EJISDC) and its own regular academic meetings through a set of international conferences and workshops, e.g., IFIP WG 9.4 began already in 1989, followed by ICTD (2006) and SIG GlobDev (2008). ICT4D research status is further verified by e.g., special issues in the SSB8J. For example, at the time of this paper, there is a special issue in MISQ about “Digital Technologies and Social Justice” [39] and in ISJ about “Information Systems and Sustainable Development” [40]. Finally, ICT4D is an independently taught subject and part of the academic teaching curriculum across the world. ICT4D specific curriculums have been developed [41] and is being taught at universities across the world [42-44].

Mindful of that assessing academic maturity is not a black and white matter, but entirely dependent on how it is measured and when, this study makes no claim to conclusively determine the ICT4D field level of maturity. Nevertheless and despite that several criteria appear to be only partially fulfilled, the community of researchers should take great pride in the field’s evolution, and where our research is read and appreciated by audiences beyond the reference disciplines of IS and development studies.

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