Presence from Absence: Looking within the Triad of Science, Technology and Development

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This paper begins with the Simmel triad, a unit formed by three different sides, in order to explore science and technology in the applied mainstream discourse of development. My analysis begins when development is oversimplified to an absence of science and technology. By placing the beliefs, values and knowledge that are embedded, produced and maintained within the triad of science, technology and development under the scholarly gaze, I illustrate the importance of understanding whether it is an absence or presence that is nurtured by the analysis and reproduced in the discourse. The paper begins with a short discussion of development as a mainstream discourse and moves into a discussion of studying the triad from the outside and inside. Using an informal case study of the Togolese educational and demographic document: **statistiques scolaires** *I explore components of the development, science and technology triad from an inside perspective and place the who, what, where, when and how of the triad within social relations and social structures in order to study science and technology as social institutions within development rather than as objects of progress.*

Keywords: Absence; Presence; Development

> "Where there is no wealth, there is no poverty either". Tswana proverb (Rist 2008, p. 230)

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The Triad
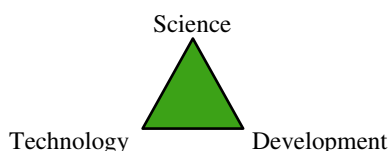
Dichotomies signal a classification system at work; they are part of a framework that identifies and names in relation to what it is not. Dyads are the "simplest sociological formation" (Simmel and Wolff 1950). They imply an absence in one half of the dichotomy that also "involves the somehow imagined, but then rejected" (Simmel and Wolff 1950, p. 119). Whereas a triad illustrates things in relation to each vertex that is composed of two relationships that may be in opposition to the third relationship, outside of the third or part of a whole. It connects things in non-linear ways that highlights different sides while unifying the three (Simmel and Wolff 1950). For example, triadic relationships have been used to study and explore science, religion and magic as social institutions and knowledge systems (Horton 1993; Malinowski 1954; Nader 1996). In this paper, I want to explore the triad of science, technology and development in order to address the epistemology of this triad. Scholarship has been devoted to each of these three terms individually; researchers have been exploring the culture, social institutions, ideologies and epistemologies surrounding science, technology or development. Out of these individual studies, "technoscience" has emerged as a way to talk about the relationship between science and technology and all the untidiness that gets lost in the process of becoming either science or technology (Haraway 1997; Latour 1987). In the aftermath of technoscience, I add the term development to the conversation. My aim is to work through what has been injected or rejected from the three sets of dyad to see the triad that is fusing into a "unity of its own personality" (Simmel and Wolff 1950, p. 135).

This paper proposes to address the triad while acknowledging that each word of the triad carries a plurality of meanings that makes addressing their relationships potentially messy, confusing, contradictory and/or inadequate. With that in mind, my goal is to open the triangle up for inspection and to see what possible avenues of inquiry are available to us, particularly scholars concerned with science and technology studies (STS), development studies and/or postcolonial studies.

In addition, rather than use the problematic terms of: first, second and third world; least/less developed and developed; or western and non-western, I use the term "outside the western club" or OWC to emphasize that membership of the club can change and does change, that it is a networked association of nations/corporations/communities. The term OWC is also meant to resist the whitewashing that often happens with western or westernization (Nederveen Pieterse 2000). The club is defined by a network with those that belong and those that do not. It is not always defined by place; there can be islands of the western club in the sea of

OWC or vice versa. Making the categorization can be just as problematic as the more commonly used terms. However, by using a term unique to this paper, I hope to highlight how OWC life is a "border zone of hybridity and impurity" (Gupta 1998, p. 6) and avoid the assumptions of familiar terms.

> Too often the poor are the forgotten victims of our tendency to oversimplify and glorify the contribution of technology to development. (Schoonmaker Freudenberger 1994, p. 21).

Development

Since 1997, United Nations Development Programme (UNDP) and partners have sponsored the introduction of multi-use engines into Mali, Ghana, Burkina Faso, Niger and other west African countries for the economic empowerment of women with low incomes and limited access to energy. The outcome has been an increase in revenue and time saved for women using the technology (UNDP 2012). For a development worker or policy-maker, the multi-use engine is an example of the day-to-day reality of science and technology as an instrument of development. The development rhetoric labels the multi-use engine as an instrument of progress and prosperity for the achievement of development goals. Or in other words, this discourse highlights the deterministic nature of science and technology in development. Those advocating for development insist on the importance and necessity of providing science and technology to underdeveloped nations in order to ensure development and a better life to its citizens (Atal 1996; Posadas 1999; UNESCO 1996). See for example the UNDP website[1] where the seven themes for "empowering lives" are: fighting poverty, building democratic societies, preventing crisis, protecting the environment, halting & reversing HIV/AIDS, empowering women and growing national capacity. On five of the seven thematic homepages technology and science are clearly identified as means for achieving the UNDP goals and omit any discussions of what socio-cultural systems might be disrupted by the introduction of the technology. Instead the webpages reinforce and reproduce the naive belief that science and technology equal progress or at the very least will bring it about. Meanwhile, development theorists are challenging the faith of the mainstream development discourse in progress (Escobar 1995).

Within development discourse's disconnection of theory and practice, the absence of science and technology requires development or the absence of development is because of the absence of science and technology. Within STS scholars are well practiced at studying the myriad ways; science and technology have been applied throughout global history, the canonical analysis of progress and determinism, and the study of science and technology as social constructions. Unfortunately mainstream development narratives (as found on the UNDP website) are generally predicated on the absence of science or technology, with the solution being to introduce science and technology that will create development: $S + T = D$. Thus,

science and technology have become enshrined in mainstream development discourses. This may be an oversimplification particularly in the light of the complexity of definitions, histories and cultures of development. However, in the absence of careful scholarship on the triad, the default or naturalized position of science and technology within the mainstream development discourse is often oversimplified to this equation.

The mainstream development narrative is often typified as an "emancipatory political project" or "human rights discourse" that brings the power of economics, statehood and individual liberty to the underdeveloped (Neocosmos 2007). Thus, development hinges on "progress". However, scholarship within STS has clearly shown that it is necessary to ask "progress towards what?" and that the relationship between progress and technology is a social construction (Marx 1987). Asking development projects "what are they progressing towards" may be a question too obvious to ask particularly where development in practice is defined as "improving tomorrow's quality of life" (Karatsu 1988, p. 180).

An outcome of this mainstream development discourse is standardization of nations and communities OWC via technologies like cell phones, automobiles and computers that are believed to be integrating them into the global community (Bend 2007, p. 73). Or development becomes "process of becoming a modern society like the already developed societies of the North" (Jürgensen 2000, pp. 225–26). Development here sounds like globalization or hybridization: "the mixing of different cultural forms and styles facilitated by global economic and cultural exchanges" (Steger 2003, p. 5). If development and globalization discourses are intimately related, a difference between the two is that development is uni-directional and is justified as bringing a better life to the receiver while globalization is multi-directional and is recognized as impacting all partners. Uni-directional development is a form of institutionalized global governmentality rather than an exchange of economic and cultural components and becomes "a form of identity" for the receiver (Gupta 1998, p. 11). Postcolonial studies have illustrated that the coupling of science and technology as instruments of development is still serving the western club as when they were instruments of colonialism and imperialism (Gupta 1998). Is the foundation of globalization built upon the ideology, institution and identity of development? Are we still caught by the promise of becoming modern and global citizens through western science and technology even as we work to critique it?

Or in other words, how do we avoid "development" as a "misleading concept" (Shrum 2005) or as a "loaded word" (Wai 2007). The mainstream development narrative persists and is repeatedly offered as the panacea to solve global and social imbalances and injustices. Development as a generic term is a process of change and social transformation that is often desired and considered beneficial. It can help individuals and communities to accept/adopt/create change. Would it be possible to remake development based upon negotiations, contestations, adaptations and accommodations rather than economic, technocratic and instrumentalist

characteristics (Wai 2007)? If we did, what role would science and technology have? Could they serve another master?

A Closer Look: Inside and Outside the Triad

Technology studies have been documenting how social relations shape technology, technology shapes social relations, and technical change, development, innovation, invention, adoption and adaption occur. One thing we have learned is that technology is not alone: it is networked and socially constructed. Technology has social relations and operates within social spaces. Starting with Marx, many studies of western club technologies have demonstrated how a valorization process for production (that occurs within capitalist societies and is equivocal for all types of society) impacts the adoption and/or presence of technological changes (MacKenzie 1998). Thus, we can expect that the story of technological change, development, innovation, invention, adoption and adaption may be different OWC. What this tells us is that, in the absence of fertile social relations or social spaces, technical change or new technologies' prognosis may be unanticipated. The history of development is full of stories such as this, where water or electric systems were introduced and failed to become ubiquitous. For example in the later half of the twentieth century, piped water was installed and adopted in an urban community of Guinea, but it did not become "the one and only" source for water in the community. After several decades, the system was in disrepair and served only a small neighbourhood near its artifices of infrastructure (Bauchspies 2012).

One possible interpretation for failures of transplanted technologies could be that the "modern" water system was allowed to fade into dis-use and dis-repair because it was always a tool, a mere implement and never a technology which "picks up the values, social projects, and ultimate purposes of those who introduced them, giving those values and purposes a shape and sturdiness they would otherwise lack" (Batteau 2010, p. 21). In other words, the water system never became "modern technology" for this urban community—an industrial artifact, a large-scale, networked system that is implemented by "specialists, engineers and military men" for the benefit of all (Batteau 2010, p. 25). From the perspective of modern technology, the Guinean community's water system failure can be attributed to the absence of the specialists to implement the networked system, the lack of modern life in the community and the dearth of values and purpose to stabilize them. While on the other hand, technologies are networked and socially constructed; they work within social meanings that are embedded in the community (Bijker, Hughes and Pinch 1987). The interpretation of transplanted technologies can begin from within the culture or from outside of it, each perspective provides a different analysis.

Thomas Misa (2011, p. xiii) reminds us that how we perceive technologies, whether from "'outside' a society or 'within' it is a far from [a] trivial matter …". In *Leonardo to the Internet*, Misa does an empirical evaluation of the distinct eras

of our technological history where historical actors choose and change "technologies in an effort to create or sustain their vision of the future" (Misa 2011, p. xiii). The eras that he names are de-marked by the social and cultural milieu: court supported, wealth-generating, industrialization, imperial, modernization, military, globalizing and networked technologies. Misa's eras capture the perspective of the western club; they may or may not be appropriate labels for a description of technology in cultures/nations that have been historically OWC. It has been well documented that the western club has used its science and technology to dominate and to define power, status and wealth (Adas 1989; Sardar 1988). An interesting exercise would be to explore the technological history of OWC in order to identify their eras and compare and contrast them with the western club's eras.

Meanwhile, a more popular story told of science or technology OWC is the arrival of technology from "outside" and it is successfully adoption, as in cellular phones. Our heroine with her trusty cell phone is able to call into the market and find a better price for her goods rather than waiting until the moment she arrives to find the best price. In this happily ever after story, answers to questions such as: what does she do to gain access to the phone, the number and the network, how does she charge the cell phone, how many cell numbers does she own/use and what happens with the cell phone when she is not using it are never part of the "success" story. The popular analysis is one of the happy consumerism that reinforces S + T = D without considering the broader impacts into the networks, relations and meanings of social life.

What I would like to propose is to use Misa's "inside" approach to think about science and technology from within a culture that historically has been OWC and has been the recipient of western science and technology via colonialism, imperialism, capitalism, globalization and/or development. For example the common story of the cell phone OWC is an outside story, the technology arrives from outside and has an impact. Human agency is limited to responding to the technology. While, the inside story starts from the social processes that are on-going, pre-existing and becoming in order to describe the negotiations and alterations that are occurring with and around the technology. It highlights that human agency is multifaceted and in dialogue with the technology. If the story of the cell phone OWC was told as an inside story, the cell phone would be placed into the culture by describing the hows, whys and whats of its introduction, usage, adaption and diffusion. It might also include alternative ways that the cell phone is being used and how it is merging, appropriating or mimicking other local technologies of communication.

This inside approach has been used by Wes Shrum (2005) in an OWC scientific culture where he finds that "the guests" or outsiders to the local scientific cultures are crucial catalysts in mobilizing discourse and resources around global initiatives but they do not control the reaction; he calls this "reagency". His analysis begins where a deterministic analysis might end, at the moment of adding science to an OWC environment and tells the story of what happens once the science is added.

Ruth Schwartz Cowan uses the "inside out" of technology to analyze when the consumer is making choices about competing technologies, what choices were made, and why within the existing social networks (Cowan 1987). Ultimately her analysis tells us more about technological diffusion and its unintended consequence than invention, innovation, and production. Since most of the invention and innovation of consumer goods is done within the western club and the consumers are located within and outside of the western club, using an analysis that begins with diffusion matches the circumstances of development rather than an analysis that starts with invention, innovation, and production.

One example of studying development and technology from the consumption junction is Schoonmaker Freudenberger (1994) analysis of development projects and labour-saving technology: the multi-use machine. She found that it is cheaper for a rural woman to perform the labour than to buy the use of the machine that would save her time. While, urban women have more income generating potential and can afford to pay for the use of the multi-use machine. Freudenberger suggests that the development projects ask not only what technology does a community want, but what will they pay for and at what cost, in order to add time management, income generation and profitability into the evaluation of technology and development.

Momentum is building for starting from within to understand the diffusion of technology OWC rather than simply tracking the number of technologies developed and disseminated as typically done in mainstream development discourse. Scholars are beginning to develop and adopt methodologies that focus on different social actors, adoption barriers, adoption criteria, social networks and innovations to enhance the accountability of technologies (German, Mowo and Kingamkono 2006). This reinforces the importance of studying the technology from the inside via the consumption junction (Cowan 1987), "the uptake of new technologies determined by income" (Edgerton 2007, p. 32) or the choices of actors in sustaining their future (Misa 2011).

An Informal Case Study: *Statistiques Scolaires*

This is an informal case study because it is not the story of the research project itself, but the story of a tool that I used in my data collection for a research project that spanned 13 years. In 1996 at the time of my first visit to interview women who were middle school science educators, I was dependent on a Togolese Ministry of Education publication called *statistiques scolaires*. It included data on the number, location, expertise and education of all educators in addition to student statistics by sex, school, grade level and matriculation. Each of the five administrative offices[2] produced their region's booklet with a manual typewriter, mimeograph machine, paper, staples, tape and the dedication of the office staff. The local office produced only a handful of copies that were most were kept on file in the regional office with several copies being sent to the national office. The *statistiques scolaires* contained a

wealth of information that I used to inaugurate my research. As I verified the data in the book with the reality of individual schools, I discovered that sometimes the information was accurate and at other times it was less than accurate. From the *statistiques scolaires* initial information, I was able to enter the Togolese educational network to begin to locate the female science educators. On route I confirmed, corrected and revised some of the information I found in it.

In 2009, I returned to Togo to follow-up on the original project and once again, I started with the *statistiques scolaires* to locate the women teaching middle school science. The first change I noticed was that there were now computers in the regional administrative offices, located on the desks of the administrators. The manual typewriters on the administrative staff's desk were gone. Only one of the regions still produced the *statistiques scolaires* in paper form. In two of the regions, the data were kept in the computer: in one instance it was in the Director's computer and in another it was in the computer of the Director of Human Resources. Another region no longer had the official data (it was now housed in a national office in town); these administrators answered my questions based upon their memories, their local knowledge of the schools and what data had landed on their desks. At one of the regional offices, I spoke with an administrative assistant who kindly recalled his predecessor who had diligently typed and produced the *statistiques scolaires* for years until the arrival of the computer and the re-organization of the Ministry of Education.

Needless to say, what had once been a task of locating the five regional *statistiques scolaires* booklets had become far more complex. It was no longer certain which office would have the information, if the information existed, if it had been collected or updated recently, and if it was accessible. Accessibility was determined by issues like: did the computer work, where were the data kept, was the person who operated that computer available, was the person amenable to providing the data, was there electricity that day to operate the computer and was the proper authority present to grant the request. The viability of the data as well as the access was also uncertain. Several of the teachers commented in 2009 that the data in the *statistiques scolaires* were not trustworthy. They laughed when I asked about it and told me not to believe the data it contained. In 1996 the information that was available in the *statistiques scolaires* included extensive demographic information on the faculty and staff, as well as detailed information on the number of students by sex, grade and school. In 2009, the same amount and type of information was no longer available. In 1996, I was able to collect the data on the number of teachers by discipline and sex. In 2009, this data were no longer recorded.

In the interval since I first collected the data, computers were introduced into the Togolese administrative offices concerned with middle school education. However, computers were not present on all desks. Computers are an expensive commodity from the West that require special knowledge. They symbolized western power and prestige and their placement reflected the Togolese social structure (Bauchspies 2000). Computers were found on the desks of Directors and other important officials within the educational infrastructure. They were not

present on the desks of administrative assistants or clerks. One exception to this was in one of the national offices, where two secretaries sat in front of computers. Their computers lacked cables. The computers symbolized the power and prestige of their boss and his office. They were valued for their presence not for their ability to power up. The presence of the computers affirmed the identity of the national educational office as "developed" and "modern". The computers presence illustrated that this office was as modern as any national educational office in the western club.

Meanwhile, the manual typewriters, typists and mimeographs had disappeared from the offices. This raised the question of who was now doing the work of compiling the data, of producing the data tables for each school and reproducing it. In 1996, it was standardized at all of the regional offices; there were clerks whose job was to do this and each office produced a booklet. In 2009, it was no longer standardized. In one instance, it was done by the director of the office and in another by the director of a division. In a third, it was done by the staff very much as it had been done previously. In the remaining, it was unclear who was doing the work and if it was being done. Standardization is a means of measuring development. In this instance of adding computers to educational administrative offices it disrupted the standardization. The computers were introduced into the work lives of educational administrators and not their staff. They may have arrived in order to modernize the office, as a gift from a donor, or at the request of the administrators. However, someone (or perhaps all)—such as the buyer, donor, recipient or office visitor—interpreted or accepted the arrival of the computers as a sign of progress or development.

If an "outside" lens is used to analyse the computer at work in the educational administrative office the interpretation will sound familiar. A new technology has been imported into the office from the western world; it requires special knowledge to use as well as a dependable source of electricity. Sounds very much like Batteau's (2010) description of modern technology: specialized knowledge, part of a larger network and embedded with values and purpose. Our case study exemplifies one of the known consequences of modern technology in that it requires special knowledge to implement, use, manipulate and repair the computer. In Togo the number of professionals with computer knowledge or experience to use the machine, to manipulate the data, to access the data and to print the data is more limited than in the western club due to the availability of computers for people to learn on. As a result, information that once was accessible to visitors of the office has now become limited to a few selected administrators via computers or through carefully guarded glossy publications.

The *Tableau de bord de l'éducation au Togo* (DPPE 2008) is a pocket size booklet printed on glossy paper full of colour bar and pie graphs illustrating the number of students by sex, types of schools, grade level and matriculation throughout the six administrative regions. It is produced by the Togolese Ministry of Education with help from UNICEF.[3] This publication contains less data than the old *statistiques scolaires*, yet it is colourful, glossy, and computer generated, having been designed for an audience that is literate in graphs. This *Tableau* is more modern

than the mimeographed *statistiques scolaires* it replaced. This version of the *statistiques scolaires* is relatively scarce and was only apparent in the offices in the capital. One administrator allowed me to photograph a 2007 edition whereas the office that was responsible for producing the booklet gave me a 2008 edition. Data were "being modernized" in its transformation from tables on plain paper into bar and pie graphs on glossy paper while it remained accessible to a few elites.

Reflecting on the Absence or Presence

In the western club, it is not uncommon to hear discussions of the information highway that is bringing knowledge into the hands of average citizens via computers and the internet. Here we have the reverse happening, a decreased availability of information for the average citizen via the technology of computers. Is this development? Modernization? And are these the desired outcomes? For this story of data and the technology, it may only be the low- and middle-level administrators along with researchers who notice this disappearance, absence and re-shaping of the yearly educational data. The high-level public administrators that I spoke with were pleased to provide their data to their global funders and supporters in a glossy publication that illustrated that they too were developing or were modern. The implication is that an outcome of development/the adoption of a new technology selectively creates new absences and presences that are shaped by existing social relations.

The analysis of the arrival of a new technology from an outside perspective has highlighted the disruption in standardization and a decreased availability of information in the public sector. Consequences that are the opposite of the typically desired outcomes of development make it easy to be disparaging of development or the recipient of development. If we use more of an inside perspective to understand the entrance of computers into the educational bureaucracy and the production of the *statistiques scolaires*, the role of the social structure in the adoption of new technologies is highlighted. Clerks who once typed documents or compiled data are not given access to computers instead they find themselves either job-less or task-less with the arrival of computers on their bosses' desks. The distribution of a limited resource: computers followed distribution rules of the pre-existing social structure.

In regards to the consumption junction (Cowan 1987), computers are an expensive item purchased by governments, non-governmental organizations and affluent individuals. They are also donated by non-governmental organizations to universities, schools and other public projects. Those with experience and knowledge to use computers have perhaps attended a course, bought a computer, had access to someone with computer or used it at the office. In general, those with access to computers have access to education, money and/or social networks. The consumption junction of computers in educational administrative offices mirrors that of the western club, where once there were secretaries and typists for bureaucrats, those same bureaucrats are now doing their own typing and

secretarial duties with the aid of the computer. In both instances, the need for secretaries or clerks has decreased by the arrival of the computer. However, the shortage of computers for all office workers has had a notable notable impact on the quality and availability of the data.

A question that the consumption junction poses is: did they (and which they?) have a choice or make a choice in bringing computers into the office? And if so what values determined that choice? Or how the computers would be used once they arrived? Only one of the six regional offices continued to produce the *statistiques scolaires* as before with the help of the computer. The other five regional administrative offices used the entrance of the computer into the office to rearrange the practice of creating a booklet, data collection and data accessibility. Was the former practice of the booklet abandoned because the person responsible no longer had the proper tools? Or was the booklet replaced by the electronic data because the person with the computer now had access to the data without the intermediary phase of the booklet and those that compiled it? The computer's meaning in relation to the Togolese social structure requires the asking of questions that reflect the everyday happenings; does the boss know how or have the inclination to learn how to use the computer? If not, do they have someone in the office /she/he can safely delegate the using of the computer without losing face? Does the computer replace the booklet as a material object for the data? Or is it a tool to produce the data? Does the computer consolidate the boss' power by providing him/her with the means to control the data? In asking these questions (and others) and finding responses, we can provide a richer analysis of the inside of the science, technology and development triad or the fusion of the dyads into a triad.

The story of *statistiques scolaires* is illustrative of development and globalization. As a uni-directional activity, it fits the criteria of development while the arrival and inescapability of computers hint at globalization. For the buyer, donor, recipient, user or observer of the computer, various identities are reinforced by the presence of the computer including that of "third world", "least developed" or "undeveloped" particularly when the cables are missing, electricity is intermittent or when only one person in the office operates the computer. In this story, what future is being created and sustained by the choices of the actors via the adoption of the computer? The outside perspective would see the absence of technology and the failure of development; the inside perspective would see the presence of a new future being created within the triad of technology, science and development and begin to articulate its personality.

> For malaria has been increasing in Africa, not because Africa is reverting in time, but because it has been entering a new future, one not envisaged in the old models. (Edgerton 2007, p. 27)

Conclusion: Seeing "More" of the Inside

Important components of the development, science and technology triad are more easily seen and identified from an inside perspective that places the who, what,

where, when and how of the triad within social relations and a social structure. In development discourses, who and what get labelled the "cause" for the failure or success of a technology are important pieces of the story that reflect perspective, intention, agency and power. The predominate strategy within mainstream development discourse is to add technology and/or science while ignoring or minimizing the messiness of addressing social relations, social processes, social networks and social space that these technologies will exist within. One development professional suggests that development projects have too often seen people as objects, resources to be developed rather than as "subjects of their own development" (Anacleti 1993, p. 47). If "subjects" also included science and technology, we could begin to ask and address questions about what science or technology is present rather than focusing on the perceived absence (Edgerton 2007). By incorporating what is present we may begin to move away from development as "looking like" the western club and begin to see the new future that is being envisioned by those OWC. This approach would require development to be grounded in science and technology as social institutions rather than as agents of progress; in so doing, the triad of development, science and technology would speak to the negotiations, contestations, adaptations and accommodations required for envisioning the future.

Acknowledgements

Notes

[1] http://www.beta.undp.org/undp/en/home.html.
[2] In 1996 there were five administrative units: Maritime, Plateaux, Central, Kara and Savanes. By the time of my visit in 2009, another administrative unit: Golfe-Lomé had been established, to respond to the growing population in the capital Lomé.
[3] DPPE: Direction de la Prospective, de la Planification de l'Education et de l'Evaluation 2008. *Tableau de bord de l'éducation au Togo: Les indicateurs de 2006–2007* Ministére des Enseignments primarire et Secondaire, de l'Enseignement Technique, de la Formation Professionnell et de l'Alphabétisation and UNICEF.

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