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Tunisian Inclusive Education: A Multi-Pronged Regional Approach

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Abstract – The Salamanca Statement (1994) defined the goal of ensuring a "School for All," including vulnerable children. Yet, there are very few empirical studies on inclusive education in Middle East and North Africa countries. Tunisia's educational system mandates compulsory schooling until the age of sixteen. However, there are high dropout rates in both lower and upper secondary schools and weak educational inclusion of learners with disabilities. Based on Booth and Ainscow's framework of the inclusion index, we propose an original study of inclusive education in Tunisia, considering the educational dimensions of culture, policy, and practice. To consider the impact of learners' environments on inclusive education, we complement the analysis with socio-economic data at the regional level. Thus, we examine regional aspects of Tunisian inclusive education using a multi-pronged approach with Data Envelopment Analysis (DEA) and Geographic Information System (GIS) tools. Results show regional disparities in the dimensions of inclusive education. This approach allows us to prioritize regions in terms of the legislation and practices needed to implement all dimensions of an inclusive educational system, based on factors such as school leadership, social situation, school distance, and disability drivers.

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INTRODUCTION

The Salamanca Statement (1994) introduced the concept of inclusive education and established the goal of ensuring "School For All", thereby including vulnerable children[1] (UNESCO, 1994; Srivastava et al., 2015). Inclusive education seeks to make the "invisible visible" by guaranteeing "access to inclusive, quality, and free primary education and secondary education on an equal basis with other learners in the communities in which they live" (UNESCO, 2006). To address the aforementioned "Education For All" objectives, Tunisia established compulsory schools for six- to sixteen-year-old children with a gross enrollment rate of 95.5 percent in 2021. The Tunisian educational system is represented by 7201 educational institutions[2] (Annex A).

Over the last two decades, Tunisia has set up a legal framework for supporting inclusive education especially for priority education areas by allocating additional support, such as human resources and school transportation programs in rural areas (Annex B). NGOs and various international organizations are also involved in inclusive education implementation and play an important role in program success[3].

Considering the multi-level efforts to implement an inclusive educational system, the conclusion of Alexaki et al. (2022) regarding the gap between theory and practice is confirmed. In the Tunisian case, the out-of-school rate at lower secondary schools has significantly increased[4] with a concentration in the northern and central Western regions of the country (UNICEF, 2013). In 2020, the situation is still critical with 11 percent of school-age children remaining deprived of learning[5]. Only 86 percent of primary schools are connected to the road network. The number of

[1] Encompassing disadvantaged children, working children, remote rural dwellers and nomads, ethnic and linguistic minorities, children affected by conflicts, and those with disabilities.

[2] 4582 public primary institutions and 1448 lower and upper secondary schools. Private institutions represent only 15 percent of primary schools and 32 percent of lower and upper secondary schools. The Tunisian educational system also offers classical curriculums and professional training programs provided by 82 establishments nationwide.

[3] Several ministries have collaborated with UNICEF and the UK embassy to launch a framework for the prevention of school dropout and failure within 20 educational institutions. The framework is based on four dimensions: pedagogical support for students, listening and support offices, remedial education, and pedagogical infrastructure. At the local level, (Committee on the Rights of Persons with Disabilities, 2019), 290 disability associations provided 310 educational institutions habilitation and vocational training for 16496 students with disabilities. In terms of capacity building, the Tunisian Organization for the Defense of the Rights of Persons with Disabilities organized sensibilization activities through workshops, training courses, and shared experiences, bringing together new partners. More projects have been established recently, but impact evaluations have not been realized yet.

[4] The rate for children from poor families in rural areas with low educated mothers increased to 10 percent in 2013: 49380 children are aged between 12 and 14 years old. Also, children at lower secondary school with a risk of dropping out represent 11.3 percent of learners: 55055 students.

[5] Statistical guide published by the Ministry of Family, Women, Children, and Seniors.

children with disabilities attending school has yet to exceed 5 percent[6]. Low and upper secondary school and vocational training schools are not considered as inclusive; they receive on average only 2 to 3 learners with disabilities.

Inclusive education initiatives require further efforts and the commitment of different stakeholders[7]. It does not concern only children with disabilities; school dropout data show that vulnerable children face higher risks given their social and economic status, such as poverty rates. Kuper et al. (2018) highlight that those barriers to inclusive education concern education as a system with a lack of policies, accessible infrastructure, and skills. It also concerns the lack of family support due to health or social issues.

Based on Booth & Ainscow framework (2002), this study aims to explore for the first time in the case of Tunisia, the different facets of inclusive education and test the Alexaki et al. (2022) paradox and the Kuper et al. (2018) barriers at the regional level. This study is structured as follows: (1) we present the Inclusive education dimension based on the Booth & Ainscow (2002) framework, (2) relevant inclusive education policies and their impacts collected from comprehensive literature review, (3) an empirical review dealing with the educational system effectiveness and inclusivity, (4) a discussion of the methodology and data used to implement the multi-pronged approach, (5) and finally a proposal of policy recommendations aimed at making the Tunisian educational system more inclusive considering the regional context and tailored needs.

1. INCLUSIVE EDUCATION DIMENSIONS

The Salamanca Statement Guide for inclusive education is used to drive self-evaluation and foster self-improvement while encompassing three dimensions; culture, policies, and practices[8] (Booth & Ainscow, 2002). The development of each dimension depends on the efforts provided from educational policies, school-specific needs, and community efforts. Educational policies are used to define the strategies implemented to circumvent the obstacles that make the participation of specific learners difficult and enhance the educational experience regardless of differences in nationality, gender, socio-economic background, performance, and disability. Such policies guarantee the "value of all individuals equally and promote

[6] Out of a total of 4583 primary schools, only 1564 receive 4439 children with disabilities; 0.36 percent of the total number of pupils enrolled in primary schools with an average of three learners with disabilities per school.

[7] It must be noted that the 2020 data evaluated here only represents children with disabilities present at school; information is not available for those not attending school and does not include previous years.

[8] Creating an inclusive culture: building community and establishing inclusive values. Producing inclusive policies: developing the school for all and organizing support for diversity. Evolving inclusive practices: orchestrating learning and mobilizing resources.

equity, compassion, human rights, and respect" (Booth, 2009). These initiatives are instigated at the centralized- or local-government level by providing an institutional framework based on "placement in the mainstream classroom, equal access to opportunities for academic and social achievements, inclusive pedagogy, and an inclusive school community" (Ainscow et al., 2004; Florian & Black-Hawkins, 2011; Göransson & Nilholm, 2014). Establishing such a process permits educational systems, as the core of inclusive education, to highlight their weaknesses and identify best practices to improve pupils' education and socialization skills (Braunsteiner & Mariano-Lapidus, 2017; Sanchez et al., 2018).

Community involvement is a key part of this process as it improves "educational opportunities and social conditions within localities" (Booth & Ainscow, 2011). To develop an inclusive culture, it is necessary to change the beliefs and attitudes of a school community represented by learners, parents, teachers, and school leadership (Alexaki et al., 2022). Outside the classroom, cooperation between teachers, schools, and parents is very important to achieving teaching objectives and improving learners' behaviors (Mylonakou and Delors, 2009). This cooperative behavior is then extended to society and leads to the creation of an informal and inclusive learning environment.

School leaders reshape a school's culture according to their attitudes, inspiring the rest of their community to foster more inclusive conditions (Charalambous, 2016); they also create a sense of collective responsibility by utilizing team spirit, encouraging active participation of its members, and enabling an inclusive decision-making process. Thus, the main role of a school leader is to eliminate all forms of discrimination and exclusion, respect the voices of everyone, and communicate inclusive policies to other members of the educational community. At the school level, it is necessary to create a mainstream classroom with a climate of acceptance that enhances interpersonal relationships between learners with or without special characteristics or socialization issues. A culture of inclusive practices is also defined by the diversification of teaching strategies adapted to satisfy the learners' needs (Vastaki, 2010). This practice requires specialized training and focuses on the implementation of new technologies (Stasinos, 2016).

To assess the effectiveness of educational change, Alexaki et al. (2022) examined the relationships present between these three dimensions and concluded that there exists a gap between theory and practice. The achievement of inclusive education presents several obstacles. Each school has its requirements that must be considered; otherwise, any initiative will fail (Bualar, 2016). Great effort and care should be taken to meet the specific needs of learners; the development of such solutions is considered complex and must encompass school agendas, local policies, and common practices. In practice, the effective management of diversity requires sufficient financial resources for building installation and logistic equipment (Ainscow & Haile-Giorgis, 1999).

2. INCLUSIVE EDUCATION PRACTICES AND IMPACTS

The development of an inclusive education policy represents the country's priorities in terms of skills and practices that reflect values, cultures, and vision (Duke et al., 2016). Analysis of the international inclusive education experiments allows researchers to translate inclusive education dimensions into strategies driven by various factors: external influences, school-specific considerations, and teacher-parent instructions (Srivastava et al., 2015). This analysis highlights how the application of these strategies differs between developed and developing countries in terms of practices and impacts (Annex C).

External influences constitute legislative and policy practices. For example, India assigned the task of developing inclusion policies to various governmental departments. Unfortunately, the departments' roles were not well defined, leading to ambiguity and confusion. Consequently, local, and national Non-Governmental Organizations (NGOs) took the lead by putting pressure on such entities to form a national policy for inclusive education. UNESCO (2007) reports that some African countries (Kenya, Malawi, Serra Leoni, and Tanzania) established initiatives that removed school fees for students with special needs. Other countries, such as Botswana, Cambodia, Zambia, and Indonesia, have launched national policy revisions focused on inclusive education (Dart, 2007; Kalyanpur, 2011; Serpell & Jere-Folatiya, 2011).

Current research focuses on exploring school-specific considerations provided to learners with disabilities in neighborhood schools, collaboration between various organizations, partial discussions, and healthcare approaches. In western China, collaboration between local government and international organizations is based on three phases: "gathering information about learners with disabilities, school policy design in collaboration with pedagogical staff, and instructional skills to address disabilities" (Deng and Holdsworth, 2007). At the local level, three of the Vietnams provinces collaborated to provide training to teachers, promote cooperation, and foster community leader involvement (Villa et al., 2003).

Developed countries have extensive experience in the consideration of teacher factors in inclusive education. Countries in North America, Europe, and South Asia, as well as Australia, have worked together to develop the Teacher Self Efficacy (TSE) approach, which is defined as a specific context" (Wray et al., 2022). The TSE approach requires specific skills, such as "the ability to collaborate effectively, to differentiate learning based on a regular formative assessment practice, to apply interdependent learning strategies, and to enact positive behavior supports in the classroom" (Sharma et al., 2013 ; Sharma & George, 2016). Parent instructions are focused mainly on how to involve parents as equal partners in the education of their children with special needs through training and sensibilization. Few studies have focused on this factor, especially those focused on developing countries.

In addition to equal access, inclusive education is contingent upon "equitable learners' impacts" (Dyson et al., 2002) and a "prerequisite for social inclusion" (Kefallinou et al., 2020). Being educated in inclusive educational settings "leads to greater social and academic achievements in school and social life" (Kefallinou et al., 2020) when compared to learners educated in segregated or less inclusive settings (Baker,1995; Carlberg & Kavale, 1980; Oh-Young & Filter, 2015). The Indonesia National Report on the Provision of Inclusive Quality for Primary and Secondary Education (UNESCO, 2009) describes the impacts of such systems at three levels: benefits for all learners by focusing on responding to diverse needs, the effectiveness of the educational system, and the promotion of a fair society. Waldron and McLeskey (2010) studied the effectiveness of educational inclusion for learners with intellectual disabilities in the United States to verify whether their academic and social progress is improved when they are integrated into a well-designed, inclusive, organized classroom.

Concerning long-term impacts, a study by Myklebust and Batevik (2014) demonstrated that half of 216 evaluated Norwegian learners with disabilities who graduated from inclusive settings are now financially independent. A decade of evidence highlights the same results of establishing effective inclusive education settings by demonstrating that separate is not always equal (Graff et al., 2013; Dessemontet et al., 2012; Hehir et al., 2016; Oh-Young & Filler, 2015). The meta-analysis of a review of 280 studies from 25 countries by Hehir et al. (2016) supports previous conclusions; when inclusive educational settings are well-designed and successfully implemented, they provide short- and long-term benefits for students, with or without disabilities.

Several other studies highlight the observation that there are no negative impacts when integrating learners with disabilities into mainstream classes (Kalambouka et al., 2007; Ruijs and Peetsman, 2009). Boer et al. (2010) conducted a longitudinal study in the USA that demonstrated that learners educated in inclusive settings are more likely to enroll in higher education and have more opportunities to be employed upon graduating; this can be explained by the fact that they are more likely to develop good social and academic skills. Similar results were obtained for a case study of Norway (Batevik & Myklebust, 2006). A longitudinal study by Kvalsund and Bele (2010) of 500 young people with disabilities over 8 years from upper secondary school until the age of 22 illustrated that mainstream classes may create social inclusion in early adult life, whereas separate special-needs classes pose the risk of further isolation.

3. EFFECTIVENESS VERSUS INCLUSIVE EDUCATION ASSESSMENT: AN EMPIRICAL REVIEW

The existing empirical evidence on inclusive education is mostly based on the framework of Booth and Ainscow (2002). Additionally, the dominant empirical approach is a mixed-qualitative analysis combining questionnaires and interviews (Gilmore, 2012; Nīmante and Daniela, 2012; Khochen-Bagshaw, 2023).

Kuper et al. (2018) adopted a Rapid Evidence Assessment (REA) approach to provide an overview of empirical studies addressing the effectiveness of interventions to improve educational outcomes and social inclusion for people with disabilities in low- and middle-income countries. They concluded that the quality of all the studies was judged to be low, indicating 'insufficient evidence' on what works to improve inclusive education due to the small number of studies and concerns about their quality.

Khochen-Bagshaw (2020) confirms that very few studies have been conducted in the Middle East and North Africa (MENA) region (Wehbi, 2006; Emam and Mohamed, 2011; Weber and City, 2012; Hodkinson, Ghajarieh, & Salami, 2018; Kutay, 2018; Behboodi et al., 2022) and suggests that in Arabic-speaking countries, progress in inclusive education is slow and fragmented, with different stages of development across the region. Alborno and Gaad (2014) investigated the case of the United Arab Emirates (UAE) using a multiple case study methodology and concluded that the main issues for the development of inclusive education are related to the educational system, such as the lack of effective training, adequate support services, and inclusive classroom structures. They also found that other factors, such as stakeholder commitment and increasing parent and community involvement, support inclusive education.

Inclusive education practices depend on the institutional organization. To strengthen institutional capacity in implementing inclusive education in Spain, Moliner et al. 2011 conducted a qualitative approach to identify 63 items related to the Booth and Ainscow (2002) framework. Based on the statistical treatment of the responses, there are no significant differences in the items related to culture and organization. Otherwise, there is a huge difference in items specific to the scale of inclusive practices. In the case of Sarajevo, Božić et al. (2012) combined quantitative and qualitative approaches to identify the best practices in inclusive education implementation based on four criteria: relevance, the capability to respond to the needs in schools' local communities, sustainability efficiency, and effectiveness. "Effective schools are educationally inclusive schools. This shows, not only in their performance but also in their ethos and their willingness to offer new opportunities to pupils who may have experienced previous difficulties" (Aisncow, 2001). By effectiveness, Drucker (1967) means doing the right things, and ensuring that the outcomes from education desired by the society are achieved.

The expanding literature on educational effectiveness and efficiency assessment is due to the development of frontier estimation techniques such as Data Envelopment Analysis (DEA) (Banker, Charnes and Cooper, 1984) and Stochastic Frontier Analysis (SFA). These techniques are suitable for multidimensional and multi-inputs-multi-outputs Decision Making Units (DMUs) like the educational system. DEA was developed to evaluate entities that provide non-rival and non-excludable goods (public goods) characterized by a production process that transforms a multiplicity of inputs into a multiply of outputs. The educational system "represent a classic example of a sector which is well served by DEA"

(Thanassoulis et al., 2016). The DEA standard model is used to analyze the effectiveness at the school level (Blackburn et al., 2014; Matias et al., 2018; Liu et al., 2016; Harrison and Rouse, 2014). According to the literature, three groups of inputs are considered: learner characteristics, school characteristics, and teacher characteristics. Studies present different types of outputs such as the proportions of learners achieving a certain grade (Bradley et al. 2001; Ramzi, 2019), the success rates (Oliveira and Santos, 2005), the number of graduates (Kirjavainen and Loikkanen, 1998), and percentage of students who do not drop out from school (Arnold et al., 1996). Other authors assessed the educational internal effectiveness by considering the following inputs: classroom organization and years of teaching experience (Lockheed & Hanushek, 1994; Coleman,1966; Arnold et al., 1996; Hanushek,1986; Mariano et al., 2021).

DEA has been commonly used to calculate composite indexes to assess human development (Mariano et al., 2021; Ferraz et al., 2020; Omrani et al., 2020; Mangaraj and Aparajita, 2020), macroeconomic performance (Mohanty et al., 2021), dynamic entrepreneurship (Dionisio et al., 2021), innovation capital index (Yu et al., 2022), educational quality (Arbona et al., 2022), and human capital quality (Msann and Saad, 2020). Stumbrienė et al. (2022) propose an efficiency-effectiveness-based conceptual framework for inclusive educational systems in 26 European countries. With the DEA methodology, they point out the lack of a common policy framework for ensuring inclusion and fairness among countries' educational systems as well as within the country between key stages. Rokhmaniyah and Chamdani (2018), using the DEA methodology evaluate the inclusive education in Indonesia to demonstrate that the implementation of inclusive education in central Jakarta needs to improve its performance. More recently, Mahmudah et al. (2021) focuses on high school education to investigate the effectiveness of the Indonesian government in managing inclusive high school education. Results show that most regions have not met the efficient performance in managing existing resources to provide inclusive and equitable quality education.

In Tunisia's case, empirical research using DEA focuses mainly on the performance of the educational system. Afonso et al. (2013) evaluated the secondary school efficiency for 24 governorates during the 1999-2008 period and found an increasing positive relationship between school resources and students' achievements. Considering the socio-economic regional characteristics, Ramzi et al. (2016) found that inefficiency in education is strongly related to poverty within the 24 Tunisian governorates. Yahia et al. (2018) investigated the impact of the educational environment on dropout rates and revealed a strong influence between school performance and school resources, especially financial ones. Using the Kao and Hwang model (2011), Ramzi (2019) contributed to the performance assessment by focusing on the Tunisian education supply chain, representing each educational level and linked by intermediate variables. Empirical results show that the inefficiency of the Tunisian educational system is mainly due to low performance in tertiary education. Yahia and Essid (2019) confirmed this result by adopting a DEA-Tobit approach to assess technical efficiency using the 2015 PISA survey. They

demonstrated that Tunisian schools could increase their outcomes by 27% using the same resources and that the socio-economic background of learners negatively impacts efficiency levels. By combining DEA methodology and machine-learning approaches with the PISA 2012 survey, Rebai et al. (2020) demonstrated that secondary school performance is mainly supported by school size, competition, class size, and female enrollments. They also mentioned that school location has no impact on school efficiency. Despite the above-mentioned studies, there is no research concerning the determinants of inclusive education in Tunisians. This current study will contribute to the literature on inclusive education and present findings that may be relevant for policymakers to improve inclusion in the Tunisian educational system.

More precisely, in light of the above insights from the extant literature on effectiveness and inclusive education, we aim to test at the Tunisian regional level, the Alexaki et al. (2022) paradox considering the Kuper et al. (2018) barriers. The following testable hypotheses are established:

H1: At the regional level, educational effectiveness is a barrier to better inclusive practices.
H2: There are regional disparities in inclusive education aspects.
H3: Educational inclusion efforts consider regional external learners' environment.

To test these hypotheses, we propose a multi-pronged methodology combining the non-parametric DEA technique to calculate the effectiveness and educational inclusion indexes and Geographic Information System (GIS) to consider regional external learners' environment.

4. INCLUSIVE EDUCATION: A MULTI-PRONGED ANALYSIS

4.1. Data and Methodology

This study is a regional multi-pronged analysis of inclusive education in Tunisia. We focus on lower and upper-secondary school-aged children and vocational training programs where dropout rates are high and inclusive education practices are absent (Bogetoft et al., 2015). We propose a regional approach to identify priority areas in terms of inclusive education for children with disabilities and those from vulnerable environments (Miskolci et al., 2016). The main objective is to focus on the regional gaps in terms of effectiveness and inclusive education deployment.

The first step in our proposed methodology is to construct effectiveness scores using the DEA methodology developed by Banker, Charnes and Cooper (1984), (CCR model) (Charnes et al., 1979; Farrell, 1957; Cooper et al., 2001) to analyze the regional performance of the educational system. This model is the most popular in analyzing the efficiency measurement of educational systems, which are considered multidimensional based on multi-inputs and multi-outputs: a student at a lower secondary school might take a vocational or high secondary school (Thanassoulis et

al., 2016). More specifically, we adopt the input-oriented variable Return On Scale (VRS) model of Banker, Charnes and Cooper (1984) (Model 1).

The multidimensional aspect is reflected by considering the students who succeed in upgrading to the next educational level to which we added the total graduates from each level and the total dropout for each level (Oliveira and Santos 2005). As inputs, total learners for each level (Hanushek 1986), as well as the total number of teachers are considered (Ramzi 2019, Bradley et al., 2001). Coleman (1966), Arnold et al. (1996) and Hanushek (1986) focus on the impact of the teacher's experience on the educational effectiveness represented in our analysis by the average seniority of teachers.

We construct inclusivity indexes (Booth & Ainscow, 2002) to assess the three dimensions of inclusivity using the output-oriented CCR model (Model 2) (Hashimoto and Ishikawa, 1993; Lovell and Pastor, 1995; Hashimoto and Kodama, 1997; Mahlberg and Obersteiner, 2001; Despotis, 2005; Murias et al., 2008) based on disability, leadership, and socioeconomic factors describing school inclusivity. The leadership index represents the effort made by the institution to receive learners with special needs into a mainstream class to give them the opportunity to interact with their normal peers (Bubpha, 2014). This effort is resumed as the inclusive management principles. Schools know more than what they use (Ainscow, 2001) and need to be proactive to identify their strategy based on what they already have rather than start from nothing. Based on that and on the data availability, we identified the factors that allows schools to receive learners with special needs into a mainstream class based on the existing resources and characteristics: average classroom size by educational level (Materechera; 2020), teacher to student ratio (Labon, 1999), and staffing (Ciyer, 2010; Intxausti et al., 2017, Mezzanotte & Calvel,2023).

Based on Mezzanotte & Calvel (2023) evaluating the educational outcomes needs to be with a focus on diverse and vulnerable students to provide insights to education systems into possible improvements. The inclusive disabilities index and inclusive social and economic index are designed to consider the educational system diverse efforts.

The frontier methodology for the effectiveness and inclusivity assessment allows us to adopt a non-parametric approach (Spearman and Kendall Tests) to study the nature of correlations among all indicators while also considering local characteristics.

Effectiveness DEA Model (Model 1)

$$Max \sum_{r=1}^{s} \mu_r y_{r0}$$

Subject to:

$$\sum_{r=1}^{m} v_i x_{i0} = 1$$
$$\sum_{r=1}^{s} \mu_r y_{rj} - \sum_{r=1}^{m} v_i x_{ij} \leq 0$$
$$\mu_r \geq \varepsilon$$
$$v_i \geq \varepsilon$$

with y_{rj} the output r of the DMU J. x_{ij} the input i used by the DMU j . $\mu_r \; and \; v_i$ are respectively the outputs and inputs weights for each DMU.

Inclusion DEA output-oriented model (Model 2)

$$Min \sum_{i}^{s} v_i x_{i0} = IC_0$$

Subject to:

$$\sum_{r}^{q} \mu_r y_{r0} = 1$$
$$\sum_{r=1}^{p} v_i x_{ij} - \sum_{r=1}^{q} \mu_r y_{rj} \geq 0 \; \forall \; j = 1,,,,,,,,,,,,,,,,,,,,,N; N: number \; of \; DMU$$
$$v_i \geq \alpha \; \forall \; i = 1,,,,,,,,,,,,,,,,,,,,p$$
$$\mu_r \geq \alpha \; \forall \; r = 1,,,,,,,,,,,,,,,,,,,,q$$

$V_{rj} = \frac{\mu_r y_{rj}}{\sum_{r=1}^{q} \mu_r y_{rj}}$ represents the contribution of each sub-indicator in the construction of the composite index. Different restrictions have been added to be sure that all of the sub-indicators participate in the composite index construction:

Restriction A : $V_{rj} \geq 0{,}0001 \; and \; \mu_r \geq 0{,}0001$

Restriction B: $\sum_{1}^{d} V_{rj} = 1 \;\; with \; d \; the \; number \; of \; sub \; indicators.$

Each indicator is based on partial sub-indicators and compiled using non-parametric DEA (Annex D). The performance indicator is based on a non-radial input-oriented model (a non equi-proportional reductions of inputs) (Aparicio et al., 2018). The inclusion indicators are based on a non-radial output-oriented model with a unique input equivalent to the value one. For both models Weights are generated using principal component analysis (PCA). Data are populated for each governorate by the official reports of the Ministry of Education for the 2014 school year (Annex E).

According to Mezzanotte & Calvel (2023) mapping the segregation in schools by socio-economic status could enable countries to design educational policies based on admission criteria or incentives for schools to increase the diversity of its population. To generate a Tunisian inclusive education map using GIS, we compiled the obtained

indicators with the results of a Tunisian household survey (2014) and the National Survey on the Budget, Consumption, and Standard of Living of Households (2015).

4.2. Empirical results

4.2.1. Data Envelopment Analysis Results

Lower and upper secondary schools and vocational training programs are most effective in the regions of Zaghouane, Kébili, and Tozeur with indicators between 71 percent and 77 percent (Table 1). Among the most effective regions, Sfax and Tunis present the highest leadership index, suggesting that they deploy great efforts in terms of supervision and human factors to ensure a good educational result (Annex F).

Comparing efficiency indicators under the assumption of non-increasing returns to scale (NIRS) to those obtained under the assumption of VRS allows us to determine the nature of returns to scale (Appendix F). Indeed, if for a given region the same efficiency indicator is obtained under both NIRS and VRS assumptions, then returns to scale decrease. Conversely, if different indicators are obtained, then returns to scale increase. Returns to scale are constant if the education system is on the technical efficiency frontier. According to the DEA results, only a third of the regions (Tunis, Ariana, Ben Arous, Jendouba, Sousse, Sfax, Monastir, Kasserine and Gafsa) operate with a constant return on scale and reach their optimal size.

Regions like Kasserine, Sousse, and Gafsa are also high-performing when considering inclusion efforts but to a lesser extent for leadership. Although it is one of the highest-performing regions, Monastir has the lowest level of leadership. The leadership index describes the capacity of each region to not only become performant but also support the required conditions to be considered more inclusive. Such characteristics are based mainly on low student-to-class and teacher-to-student ratios and a sufficient number of supervisors and advisers. According to the leadership and disabilities indexes, the coastal regions of Sousse, Ben Arous, Tunis, and Sfax exhibit the highest levels of leadership and disability inclusion simultaneously (H1 rejected).

The regions of Kef and Kébili should make a greater effort to be more inclusive of learners with disabilities given that their educational institutions have the required capacity in terms of leadership. (H1 accepted) The greatest efforts remain to be made by the regions of Ariana, Zaghouane, Tozeur, Jendouba, and Tataouine, whose institutions are unable to create a favorable environment for the inclusion of learners with special needs (H1 accepted).

The social inclusion index includes the initiatives launched by institutions, such as meals provided in the canteen, boarding student conditions, and the provision of scholarships. The regions of Tozeur, Ben Arous, Mannouba, and Monastir are not socially inclusive, unlike the regions of Jendouba, Kairouan, Sidi Bouzid, and Kasserine (H2 accepted).

Considering only these indicators, such an analysis seems insufficient when presenting an overall analysis of inclusion in the Tunisian education system for learners aged 12 to 19 enrolled in lower and upper secondary school and vocational training and identifying those most threatened by exclusion.

Table 1: Educational Composite Indexes

	Educational Effectiveness Index	Leadership Inclusive Index	Disability Inclusive Index	Social Inclusive Index
Tunis	100%	100.0%	100.0%	40.2%
Ariana	100%	68.1%	38.7%	12.5%
Ben Arous	100%	89.5%	100.0%	7.8%
Mannouba	84%	58.2%	58.8%	8.5%
Nabeul	94%	75.9%	100.0%	45.1%
Zaghouan	77%	69.3%	38.6%	31.0%
Bizerte	90%	65.1%	50.0%	29.5%
Béja	81%	70.6%	58.0%	44.2%
Jendouba	100%	68.8%	35.5%	76.7%
LeKef	80%	100.0%	45.2%	53.8%
Siliana	83%	76.3%	82.9%	68.4%
Sousse	100%	83.2%	100.0%	28.6%
Monastir	100%	58.2%	100.0%	9.6%
Mahdia	87%	67.1%	74.0%	60.2%
Sfax	100%	100.0%	100.0%	50.6%
Kairouan	83%	72.9%	78.8%	77.4%
Kasserine	100%	86.8%	61.3%	100.0%
Sidi Bouzid	82%	94.5%	64.5%	100.0%
Gabès	89%	86.8%	81.8%	34.0%
Médenine	91%	67.3%	83.2%	46.0%
Tataouine	85%	61.4%	25.9%	17.1%
Gafsa	100%	76.5%	61.3%	42.9%
Tozeur	71%	69.7%	38.6%	7.2%
Kébili	73%	94.7%	42.0%	11.0%

Source: Author's compilation.

4.2.2. Non-Parametric Correlation Analysis

Non-parametric Spearman and Kendall ranks are used to analyze the data at the national level and perform correlation analysis between the different indicators. Spearman and Kendall testing (Table 2) demonstrates a significant negative correlation between the dropout rate and the effectiveness index (Spearman: -0.3572 (Prob > |t|= 0.0866), Kendall: tau-a= -0.2536 (Prob > |z|= 0.0678). The positive correlation seen between the effectiveness index and the disability inclusion index is significant at the national level (Spearman: -0.4877 (Prob > |t|= 0.0156), Kendall: tau-a= 0.3877 (Prob > |z|= 0.0063). A positive correlation is noted between the poverty rate and the social and economic inclusion indexes (Spearman: 0.6715 (Prob > |t|= 0.0003), Kendall: tau-a= 0.4819 (Prob > |z|= 0.0010). In this correlation analysis, we also considered other relationships that turned out to be non-significant.

Table 2: Spearman's and Kendall's Ranking Tests

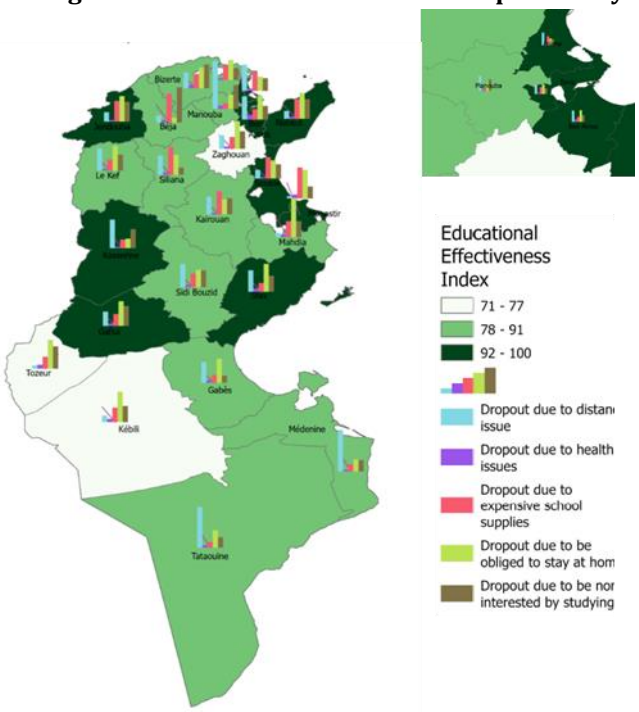
	Spearman's Test		Kendall's Test	
Effectiveness-Dropout correlation	Spearman's rho	-0.3572	Kendall's tau-a	-0.2536*
	Prob > |t|	0.0866*	Kendall's tau-b	-0.3025*
			Kendall's score	-70
			SE of score	37.787
			Prob > |z|	0.0678
Effectiveness-Disabilities inclusion correlation	Spearman's rho	0.4877	Kendall's tau-a	0.3877**
	Prob > |t|	0.0156**	Kendall's tau-b	0.4301**
			Kendall's score	107
			SE of score	38.792
			Prob > |z|	0.0063
Effectiveness-Leadership correlation	Spearman's rho	0.0273	Kendall's tau-a	0.0471
	Prob > |t|	0.8993	Kendall's tau-b	0.0511
			Kendall's score	13
			SE of score	39.082
			Prob > |z|	0.7588
Educational effectiveness-Social inclusion correlation	Spearman's rho	0.2894**	Kendall's tau-a	0.2101
	Prob > |t|	0.0156	Kendall's tau-b	0.2125
			Kendall's score	58
			SE of score	40.233
			Prob > |z|	0.1566
Socioeconomic inclusion-Poverty rate correlation	Spearman's rho	0.6715***	Kendall's tau-a	0.4819***
	Prob > |t|	0.0003	Kendall's tau-b	0.4881***
			Kendall's score	133
			SE of score	40.229
			Prob > |z|	0.0010
Poverty rate -Dropout due to financial issues correlation	Spearman's rho	0.1702	Kendall's tau-a	0.1449
	Prob > |t|	0.4267	Kendall's tau-b	0.1487
			Kendall's score	40
			SE of score	40.127
			Prob > |z|	0.3311
Inclusive disabilities index - Total disabilities correlation	Spearman's rho	-0.2074	Kendall's tau-a	-0.1449
	Prob > |t|	0.3309	Kendall's tau-b	-0.1499
			Kendall's score	-40
			SE of score	39.926
			Prob > |z|	0.3287
Dropout rate due to the distance - More than 4 km school distance correlation	Spearman's rho	0.0545	Kendall's tau-a	0.0181
	Prob > |t|	0.8004	Kendall's tau-b	0.0185
			Kendall's score	5
			SE of score	40.171
			Prob > |z|	0.9207
Dropout rate due to the distance- Between 2 and 4 km school distance correlation	Spearman's rho	0.0685	Kendall's tau-a	0.0471
	Prob > |t|	0.7504	Kendall's tau-b	0.0484
			Kendall's score	13
			SE of score	40.105
			Prob > |z|	0.7648

*Note: ***significant at 1 percent **significant at 5 percent *significant at 10 percent.*
Source: Author's compilation.

4.3. Geographic Information System for Inclusive Education

By calculating the different indexes at the regional level, we consider the input-output educational system as autonomous and non-connected to the external environment. In practice, we cannot disassociate the learner's external environment, i.e., family, health, and financial situations, from educational performance. The use of a multi-pronged approach based on geographic informatics would be most informative in providing a regional overview of inclusive education as well as in targeting a strategy that embraces the characteristics of each social and educational system by region.

Figure 1. Regional effectiveness and school dropout analysis



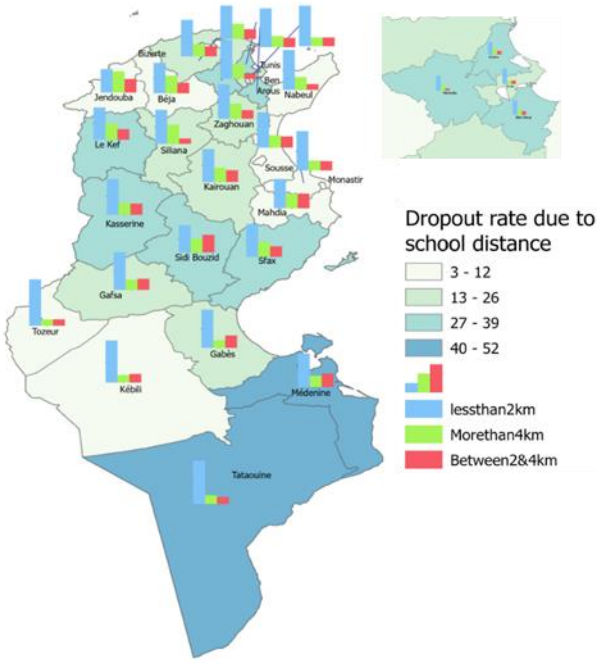
Source: Author's compilation.

Regional analysis of educational effectiveness with dropout factors (Figure 1) highlights how schools are disconnected from the learner's environment. The highest-performing regions (Beja, Tozeur, Jendouba, and Gafsa) exhibit the highest dropout rates as learners are obliged to stay at home or are not interested in school (H3 accepted). Non-parametric testing (Table 2) allows us to identify the external factors driving dropout and reflect on which initiatives can reduce such risks.

The Tunisian educational system is deployed efficiently throughout the country. According to a household survey, most houses are located within 2 km of a school. However, the data showing a higher dropout rate due to the distance between

houses and schools reaches more than 50 percent in some regions such as Medenine and Tataouine and ranges between 27 percent and 39 percent in Kef and Kasserine, Sidi Bouzid and Sfax (Figure 2). Some regions have dedicated public transportation services for students, but in other areas, learners have to use the same transport services as community members who are not in school. Common public transport services are not effective and dangerous, thereby explaining dropout due to distance.

Figure 2. Regional analysis of distance inclusion

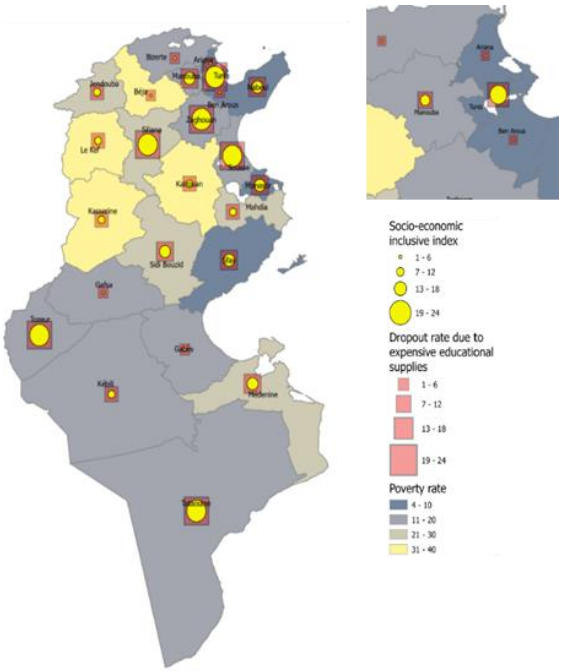


Source : Author's compilation.

The socioeconomic index represents the efforts made by the educational system to ensure educational access to poor learners (Ramzi et al. (2016) (Figure 3). The poorest regions in Tunisia (Beja, Kairouan, Kef, and Kasserine) where education is perceived as a social elevator should be focused on social support to tackle dropout risks. Siliana, which has a high dropout rate, should try harder to be more inclusive than less poor regions such as Mannouba, Tunis, Zaghouane, and Sousse (H3 accepted).

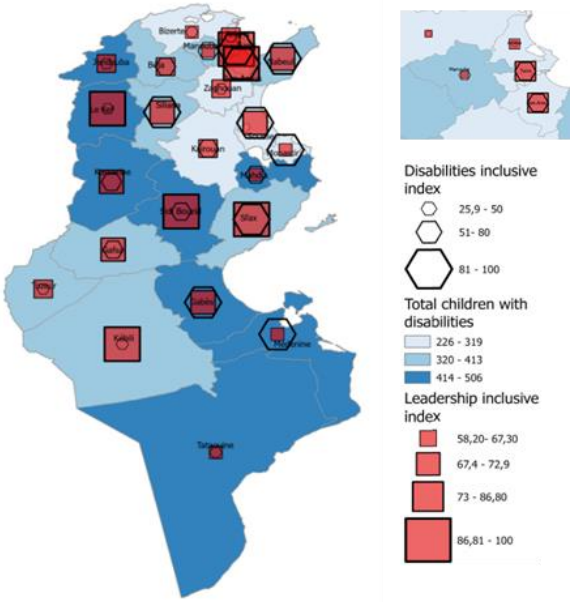
A rural-urban analysis would provide us with more information regarding these incomprehensive regional disparities. When considering inclusive education for learners with disabilities at the regional level, three different variables need to be considered: the inclusive educational index, the leadership index, and the total population of 12-19-year-old children with disabilities by region (Figure 4) as compiled from the population survey with respect to age group with the proportion of children with disabilities enrolled in a school.

Figure 3. Regional socioeconomic educational inclusion



Source : Author's compilation.

Figure 4. Regional disabilities inclusion and leadership



Source : Author's compilation.

The inclusive leadership index reports the ability of the educational system to be more inclusive in mainstream classes at the regional level. Regions with a high number of children with disabilities (Kef, Sidi Bouzid, and Kebili) should be capable of greater inclusivity given their higher leadership index. The regions of Medenine and Mahdia are lacking in the provision of resources needed to be more inclusive (H1 accepted). Other regions with low leadership indexes cannot be more inclusive at present (Tozeur, Gafsa, Beja, Bizerte, Manouba, and Zaghouane) and need more support in terms of external and teacher factors.

5. POLICY RECOMMENDATIONS

Education is considered a social elevator, and the systems in place mandate that no child should be left behind. Considering the different aspects evaluated in this study, inclusion should be prioritized by policymakers and approached differently. Obviously, the school experience depends on "mesosocial" factors, including policymakers, schools, families, and learners' environment (Entwisle, 1990). Among these factors, school is the most significant factor in ensuring inclusivity. Mesosocial factors are categorized into three umbrellas: prevention, governance, and external environment. Different recommendations can be made within each umbrella. In the Tunisian case, a significant effort should be made to prevent school exclusion for each reason exposed in this study.

The most effective prevention policy is based on gathering data on the socio-economic situation of learners at high risk of dropping out and those with disabilities. Such data enables the design of effective, targeted public policies. The Global Education Monitoring Report (UNESCO, 2020) mapped the inclusive education financing policies among 18 European countries and highlighted that only 5 countries have pertinent data. These policies fall under the governance umbrella, which is considered at different levels. The responsibility for inclusive education should not rest solely on one supervisory authority. According to UNESCO, improved inclusivity relies on an effective distribution of responsibilities among the Ministry of Health, the Ministry of Social Affairs, and the Ministry of Education, which should operate collaboratively, cooperatively, and in coordination. Necessary tools to ensure this effectiveness include the establishment of measurable standards, as exemplified by Jordan.

Data gathering also enables the implementation of more effective financing policies, such as the allocation of vouchers per student, as in Argentina, or the adoption of targeted education financing programs aimed at specific students and their families in the form of cash transfers. Public authorities must prioritize inclusive education by implementing the financial levers necessary for the transition of educational establishments from regular schools to inclusive schools. Thus, every school will have the necessary financial support to establish the infrastructure required for accommodating disabled students, recruit educational aides, and empower teachers as agents of change in implementing the values, practices, and attitudes essential for inclusivity.

Local authorities can also be involved in the implementation of inclusive education, especially in rural areas. For example, the 'Open Doors' center in Comlosu Mare (Romania) has been open since 2007 as part of a 'Hope' project called 'All Together for Inclusive Education.' The center was established in collaboration with several local partners: the city, local authorities, and the school. Other examples include Cleves Primary School, an inclusive school at the heart of a local authority that promotes inclusion. This partnership is founded on community commitment, which depends on school-family relationships, particularly the school leadership in building dialogue with families through a communication strategy (Perrenoud, 2015, 2021). This enables teachers to feel supported in their interactions with families. Ultimately, family involvement is reflected in family-related factors. Janosz argues that generally, it is family and school variables that possess the greatest predictive and screening power, especially during adolescence, when school-related variables remain the best predictors of school dropout.

More work is needed at all levels (teachers, schools, policymakers, and parents) to effectively initiate inclusive education. The connections made between schools, learners and their environment, educational policymakers, NGOs, and the private sector are key to building partnerships at the regional level and responding to specific needs according to the local context.

CONCLUSION

School is a pivotal part of society and should reflect inclusion. As a process of change, inclusive education focuses on humanity and requires the coordination of policy, practice, and culture. Based on the Booth and Ainscow framework, our study is the first to empirically analyze inclusive education in Tunisia. We adopted a multipronged approach using DEA and GIS tools to highlight the correlation between educational system effectiveness and inclusivity at the regional level. Our findings demonstrate that effective inclusion is still in an embryonic state and reveal regional disparities in each aspect of inclusivity and its correlation to effectiveness.

Unfortunately, this study presents several limitations. Data unavailability on children with disabilities prevents us from providing a more precise panorama of inclusive education in Tunisia, especially considering the degrees of disability. Additionally, we are unable to provide a dynamic analysis because the latest data on learners' external environment are from the 2014 Tunisian household survey and the 2015 National Survey on the Budget, Consumption, and Standard of Living of Households.

Translating the belief in inclusion into smart policies that are easily applicable and institutionally supported requires data gathering, more targeted efforts, and compliance with local needs. Empirical studies on inclusivity are not well developed in Tunisia, and the gap in evaluating social public policies based on inclusivity should be addressed.

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ANNEX

Annex A: Inclusive education statistics (2020)

Educational level	Primary education	Low secondary education	Vocational training	Higher secondary education
Total School	4583	815	82	552
Total learners	1202667	522332	9840	458131
Dropout learners	7216 (0.6 percent)	32384 (6.2 percent)	NA	37109 (8.1 percent)
Public Schools receiving learners with disabilities	1564	400	19	270
Total learners with disabilities	4439 (0.37 percent)	1120 (0.21 percent)	31 (0.31 percent)	671 (0.14 percent)
Average learners with disabilities by school	3	3	2	2

Source: Ministry of Family, Women, Children and Seniors.

Annex B

2002	Ministry of education	The Act 2002-23, July 2002 is a regulation to aid through meals, scholarships, and Boarding school to students from low-income families to guarantee their access to education
		The directive on education and schooling specifies that the Tunisian State has to guarantee the right to free education to all students of school age at public institutions and provide equal opportunities for all students. All students with special needs have the right to benefit based on the nature of their disability, from all the necessary measures to guarantee their full integration into society and mainstream classes and their protection
2003		The strategy for the educational integration of children with disabilities has been established with the aim that all children with disabilities must be integrated in mainstream closest school to their home
		The ministry of social affairs, solidarity, and Tunisian abroad called the school to adopt a specific approach and to implement measures to facilitate their inclusion and prevent any form on discrimination in and out of the classroom during any cultural and social activities.
In 2003-2004		The national program for the integration of children with disabilities replace the special school approach to be replaced by an integrated one in a mainstream classroom
2005		Tunisia adopted Act N°2005-83 guarantees the right to education training rehabilitation and training for children with special needs
2019	Ministry of education	Affect children aged 6 to 9 with disabilities in preparatory classes within primary schools since the 2019-2020 school year.

Annex C: Inclusive education strategies analysis

Factors	Authors	Country	Strategies	Details	Effect
Teacher instructions	European agency (2003) Dyssegaard and Larsen (2013)	15 European countries Denmark	Co-operative teaching between a range of professionals within and outside the school	Giving the opportunity to participate in classrooms while teachers have an opportunity to learn from each other.	Positive
	Farell et al. (2010) Sharma and Salend (2016) Radford et al. (2015)	UK Australia International comparison	Teaching assistants in an inclusive classroom	An unclear professionals' roles, limited communication, ineffective and separate instruction that undermines inclusion	Negative
	Hehir et al. (2016)	International comparison	Collaborative problem-solving	The learners adopt a structural process of problem solving. This approach of inclusion of students with disabilities has a positive impact on themselves and on learners without disabilities	Positive
School specific considerations	Denge and Holdsworth (2007) Villa et al. (2003)	China Vietnam	Collaboration	Collaboration between the local government with local and international NGOs by providing teacher training	Positive
	Ngcobo and Muthukrishna (2011) Narayan et al. (2005)	South Africa India	Local school placement	Students with disabilities placement in the classroom through goodwill and a positive attitude	NA
School and teacher considerations	Hattie (2009)	International comparison	Structured infrastructure/ teaching and meta-cognitive strategies	These strategies are the most effective for raising achievements	Positive
External influences	Alur (2002)	India	Shared responsibilities of government departments	Two government departments were responsible for the education of learners with disabilities	NA
	Dart (2007) Kalyanpur (2011) Serpell and Jere-Folatiya (2011) UNESCO (2007)	Botswana Cambodia Zambia Indonesia	National policy revision	Establishing a revision for national education policies to enhance or implement inclusive education	NA
Parent instructions	UNESCO (2003) The World Bank (2005)	India Cairo	Training and sensibilization	Parents' involvement in the education of their children with disabilities	NA

Source: Author's resume.

Annex D

Input-Output DEA model	**Educational effectiveness index**	
	Outputs	Students who passed the school year Low secondary school Students who passed vocational training upper secondary school Students who passed the school year vocational training Total graduates' Low secondary school Total graduates' upper secondary school Total graduates vocational training Total dropout low and upper secondary schools
	Inputs	Total learners' low secondary school Total learners' Upper secondary school Total learners vocational training Total teachers low and secondary school Total teachers vocational training Average seniority of teachers
Output oriented DEA model	**Inclusive leadership index**	
	Outputs	Average classroom size low secondary school Average classroom size upper secondary school Average classroom size vocational training Teacher to student's ratio low and upper secondary school Teacher to student's ratio vocational training Advisers low and upper secondary school Advisers vocational training Supervisors low and upper secondary school Supervisors vocational training
	Inclusive disabilities index	
	Outputs	Institutions receiving learners with disabilities low secondary school Institutions receiving learners with disabilities upper secondary school Institutions receiving learners with disabilities vocational training Total learners with disabilities low secondary school Total learners with disabilities upper secondary school Total learners with disabilities vocational training
	Inclusive social and economic index	
	Outputs	Total students beneficiating from scholarship Total students on half-board Total boarding school students
GIS approach	•Educational effectiveness index	
	•Inclusive leadership index	
	•Inclusive disabilities index	
	•Inclusive social and economic index	
	•School dropout raisons	•School distance •Obliged to stay at home •Health issues •Financial issues •Non interested by school
	•Distance to school	•Less than 2 KM •Between 2-4 KM •More than 4 KM
	•Regional data	•Regional poverty rate •Children with disabilities by region

Annex E

Variable	Mean	Std, Dev,	Min	Max
LS Institutions	31,70	13,02	13	74
US Institutions	21,35	7,01	9	43
Vocational training Institutions	3,52	1,88	1	8
Educational Effectiveness index	0,89	0,10	0,71	1
Inclusive educational leadership index	0,77	0,13	0,58	1
Inclusive educational disabilities index	0,66	0,24	0,26	1
Inclusive educational social index	0,41	0,29	0,07	1
Dropout rates Low secondary education	0,01	0,01	0	0,03
Dropout rates upper Secondary education	0,13	0,01	0,1	0,16
Dropout rate due to the distance	0,22	0,14	0,03	0,52
Dropout rate due to the obligation to stay at home	0,27	0,10	0,06	0,49
Dropout rate due to health issues	0,03	0,01	0,02	0,06
Dropout rate due to financial issues	0,19	0,09	0,07	0,39
Dropout rate due to a noninterest in education	0,21	0,08	0,09	0,44
Dropout rate due to other reasons	0,06	0,06	0	0,22
Home to school distance:<2Km	0,61	0,09	0,4	0,79
Home to school distance: 2Km-4Km	0,17	0,05	0,09	0,3
Home to school distance: >4Km	0,22	0,06	0,11	0,36
Poverty rate	0,18	0,10	0,04	0,35
Total disabilities	366,22	89,04	226	506

Annex F

	VRS effectiveness score	CRS effectiveness score	Non increasing return on scale	Scale efficiency	scale
Tunis	100,00%	100,00%	100,00%	100,00%	Constant
Ariana	100,00%	100,00%	100,00%	100,00%	Constant
Ben Arous	100,00%	100,00%	100,00%	100,00%	Constant
Mannouba	81,41%	63,84%	63,84%	78,42%	Increasing
Nabeul	90,72%	85,43%	85,43%	94,17%	Increasing
Zaghouan	77,14%	54,28%	54,28%	70,37%	Increasing
Bizerte	87,31%	80,07%	80,07%	91,71%	Increasing
Béja	72,77%	63,05%	63,05%	86,64%	Increasing
Jendouba	100,00%	100,00%	100,00%	100,00%	Constant
Le Kef	79,53%	59,06%	59,06%	74,26%	Increasing
Siliana	94,51%	89,02%	89,02%	94,19%	Increasing
Sousse	100,00%	100,00%	100,00%	100,00%	Constant
Monastir	100,00%	100,00%	100,00%	100,00%	Constant
Mahdia	91,95%	83,90%	83,90%	91,25%	Increasing
Sfax	100,00%	100,00%	100,00%	100,00%	Constant
Kairouan	77,58%	57,49%	57,49%	74,10%	Increasing
Kasserine	100,00%	100,00%	100,00%	100,00%	Constant
Sidi Bouzid	94,85%	89,70%	89,70%	94,57%	Increasing
Gabès	88,98%	81,74%	81,74%	91,86%	Increasing
Médenine	89,02%	78,04%	78,04%	87,67%	Increasing
Tataouine	93,83%	87,66%	87,66%	93,42%	Increasing
Gafsa	100,00%	100,00%	100,00%	100,00%	Constant
Tozeur	71,27%	42,54%	42,54%	59,69%	Increasing
Kébili	78,74%	69,67%	69,67%	88,48%	Increasing

L'éducation inclusive en Tunisie : Une approche régionale multidimensionnelle

Résumé **–** La Déclaration de Salamanque (1994) a défini comme objectif d'assurer une « École pour Tous », y compris pour les enfants vulnérables. Or il existe très peu d'études empiriques sur l'éducation inclusive dans les pays de la région MENA (Afrique du Nord et Moyen-Orient). En Tunisie la scolarité est obligatoire jusqu'à l'âge de seize ans. Cependant, les taux d'abandon sont élevés dans les collèges et les lycées et il est constaté un faible taux d'inclusion des apprenants en situation de handicap. En nous appuyant sur le cadre conceptuel de l'indice d'inclusion de Booth et Ainscow, nous proposons une étude originale de l'éducation inclusive en Tunisie sous ses différentes dimensions. Nous complétons l'analyse par une approche spatiale permettant d'examiner l'impact des environnements socio-économiques des apprenants sur l'éducation inclusive. Nous utilisons pour cela une approche multi-dimensionnelle avec la méthode DEA (Data Envelopment Analysis) et une représentation par le Système d'Information Géographique SIG. Les résultats montrent des disparités régionales dans les différentes dimensions de l'éducation inclusive. Cette approche permet de prioriser les régions en fonction de la législation et des pratiques nécessaires pour le renforcement de toutes les dimensions d'un système éducatif inclusif, en tenant compte de facteurs tels que le leadership scolaire, la situation sociale, la distance scolaire et les facteurs liés au handicap.

Key-words
Éducation inclusive
Méthode DEA
Analyse spatiale
Économie de l'éducation
Tunisie