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The relevance of medium of instruction and mother tongue for different types of educational systems

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ABSTRACT

The relationship between student performance in education and medium of instruction needs to be investigated in a systems-oriented way, comparing what educational systems are able to achieve given different medium of instruction policies. This article combines data on language, medium of instruction, participation in education and effectiveness of education to propose a new categorization of educational systems: colonial systems, decolonial systems and systems in transition. It shows that there is an evolution towards decolonial systems, but that such an evolution will require a transition to indigenous languages as medium of instruction. It briefly discusses the pitfalls and possibilities of such a transition.

1. Introduction

The UN's Sustainable Development Agenda 2030 (United Nations, 2015) contains one goal on education: SDG 4, which is to 'Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all'. This is a far cry from how education, especially in the global South, was conceived in colonial times: it was never intended to be inclusive or equitable and it certainly did not aim at 'all'. Instead, its aim was to create a small elite, useful for colonial rule (White, 1996; Charton, 2000). Thus, there are two features that are key to the way colonial educational systems were designed that are different from the way in which SDG 4 would want to see educational systems design. One is that colonial systems were designed to be *inefficient* from the 'education for all' perspective, in the sense that the aim was not to give meaningful knowledge to those that entered education but rather to select those few that were seen as suitable for further roles in colonial society (the mission and the administration). The second feature is that they were designed for *low participation*. These features can still be seen in colonial educational systems today, as will be illustrated in this article.

Colonial education was never completely successful: it also created a basis for ever more sophisticated forms of resistance. Yet one thing is clear – education that aims to bring attainment of sustainable development goal 4 closer must be radically different from colonial education. Is that the case? How can a transition come about? What are the characteristics of decolonial forms of education? What is the relationship, if any, with medium of instruction? These are large, but relevant questions that cannot all be addressed within the space limits dictated by the article format. Yet, we can make a start.

Research on student performance in education in relation to medium of instruction often focuses on how to improve the performance of individual students: on the language background of students (whether the medium of instruction is the L1 or the L2 of the student) (Walter, 2014), on advances in pedagogy (for example in Teaching English as a Second Languages, TESL) (Richards, 2002) or, more widely, on how students, in general, go about acquiring the required language skills (Macaro, 2003). What is lacking is a more sociological, systems-oriented approach. Such an approach would compare educational systems as such. Inputs into such a system (funds, policies, human resources) are always going to be limited. Given such limitations, how well do educational systems do in delivering quality education that is suitable to the capacities of those engaged in the system?

This article attempts such a systems-oriented approach and uses it to investigate whether, and if so how, the medium of instruction and the performance of educational systems in different parts of the world are related. In order to do that, one would need to have information on the medium of instruction in relation to the L1 of students and teachers, on the educational quality, and on participation levels in education. A working hypothesis would be that in general, those educational systems in which the medium of instruction is the same as or close to the mother tongue or L1 of students perform better - the quality of the output is better and the participation in education is higher – than those systems in which the medium of instruction is (very) different from the L1 of students.

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Educational systems are dynamic by nature: reforms are common; participation in education changes over time. However, educational systems are in part conditioned by the different functions they have in reproducing the cultural and linguistic capital of a country, as argued by Bourdieu and Passeron (1979). These functions are different in different parts of the world. Historically, a distinction can be made between those educational systems that evolved in the global North and those in the global South. Whereas in the North, educational systems evolved in relation to the developments and social struggles in national societies, in the South colonial educational systems and their purposes were related to the context of domination in which they were first established. To what extent are these differences still visible today, also in relation to the medium of instruction?

In order to explore this, section two starts with an explanation of the theoretical positions on language and medium of instruction that this article is based on, making use of the distinction between language as *discerned* and language as *designed*. Section three then outlines the choice of indicators used for comparing quality of education, participation, and medium of instruction. These indicators will be used to come to a proposal for a categorization of educational systems based on their current performance and historical background. It is proposed to see educational systems as colonial, transitional, or decolonial. Sections four and five take a forward-looking approach, discussing the transitions that are likely to happen over the next decades, the relationship with medium of instruction, and the principles that could guide such a transition. Section six then discusses economic and cultural factors that have been pointed to in the literature as explanations for differences in the quality of education. The article ends with a summary of the arguments presented and some conclusions.

First, then, we turn to our position on how to look at language issues in education from a theoretical perspective.

2. Some remarks on medium of instruction and mother tongue

The theoretical approach used for investigating the relationship between educational systems and medium of instruction is largely taken from Van Pinxteren (2022). The medium of instruction is the language that is used for giving oral instruction, but also the language that is used in teaching materials (written material) and, significantly, in carrying out assessments and exams. In general, these categories represent diminishing degrees of variation and freedom: in class, teachers and students can and often do use whatever speech registers are available to them. This may include using dialectal variants, code-switching, translanguaging, in-class translation, etc. However, the teaching materials and exams are usually in some form of standardized or intellectualized language. Furthermore, at the primary level, more freedom in how to speak and how to test is generally allowed as compared to secondary and tertiary education.

Van Pinxteren (2022) and (forthcoming), inspired by earlier work by Kloss (1967), has proposed to distinguish between language as *designed* and language as *discerned*. In his view, language databases like the Glottolog[1] or Ethnologue use certain criteria for designating various speech forms as different 'languages' – thus, they *discern* languages. However, in many countries around the world, speakers of several (usually related) speech forms or discerned languages use a common *designed* or intellectualized language for use in formal domains, such as in law, government or higher education. It is this designed language that is generally taught in schools – in most countries, it is not spoken at home.

In this article, therefore, when reference is made to 'language' or to 'medium of instruction', we mean the formalized or designed form of language that often serves speakers of several related *discerned* languages. For example, in Germany the Ethnologue discerns 14 German-like languages.[2] These are not all mutually intelligible. However, the standard language and the medium of instruction in that country is *Hochdeutsch*, the intellectualized or *designed* form of language that serves the speakers of all 14 related German-like languages. Discerned languages are usually acquired in school, although the media (television, etc) may also play a role.

This means that in most countries, the 'mother tongue', the speech register the child acquires before going to school, will be in some ways different from what is taught in school. Still, children whose mother tongue is closely related to the designed language taught in schools are usually considered to be 'monolingual'. However, many children learn to use more than one speech register before they enter school and these registers may be considerably different from one another. This may be the case for children who have parents with two different first languages (and who each use their first language with the children) or for children raised in extended family settings, such as still prevalent in some parts of Africa. These children can effectively acquire more than one 'mother tongue'.

What should be noted is that for example in immigrant situations, parents may not have a good command of the standard *designed* language of the host countries. If these parents nevertheless choose to use that standard language with their children, this may in fact have adverse consequences, with children entering school with low proficiency in *any* language (Barac and Bialystok, 2012). In general, it seems that raising children bi- or multilingually from birth is possible and generally beneficial for them, but only if those that use the different speech registers with the children are themselves highly proficient users of those registers.

Another remark about the relationship between mother tongue(s) and medium of instruction is important. This is about the relevance of the differences between the speech register(s) children already have and the medium of instruction. In very general terms, teaching a *designed* language that is close to what children already know is easier and more efficient than teaching one that is very different from what children already know. This is an area that is under-researched, but Van Pinxteren (2022: 94) gives information from US research, to the effect that teaching a very different language takes around four times as much time and effort as teaching a closely related language. This is echoed in other research, for example, Yeong and Liow: 124 (2012) conclude that 'the positive influence of one language on the acquisition of skills in the other language will be more limited when the phonological and morphological components of the children's two languages are as different as Mandarin and English.'.

With this in mind, we can now look at education systems the world over and investigate the relationships between coloniality, education, and medium of instruction a bit more closely.

3. Educational systems and medium of instruction: a new classification

Trow (1974, 2006) was the first to develop a classification of systems of higher education according to their function in society. In his rule of thumb, educational systems that cater to less than 15 % of the population can be termed 'elite' systems; education for between 16 % and 50 % of the population was termed 'mass' education, and education aimed at over 50 % of the population was termed 'universal'. This categorization reminds one of the work of Bourdieu and Passeron (1979), who analyzed the role of higher education in reproducing the cultural capital of a country and in maintaining and legitimizing the position of elites in society. Trow was writing about education in 'modern' societies, by which he essentially meant the global North. At the time he wrote his

[1] https://glottolog.org/

[2] https://www.ethnologue.com/country/DE/ accessed 22 June 2023.

article, in 1974, the proportion of tertiary enrollment to the population age 20–24[3] in the global South was just over 5 % (whereas in the global North, it was over 21 %) (Altbach (2012: 96). Therefore, where a transition from elite to mass systems of higher education was underway in countries in the global North, this was still a long way off in the South.

Since then, a lot has happened. One relevant development has been the rapid expansion of higher education in the global South. This has been coupled with an increasing debate about the role of education in the South and the need for its decolonization. Another development has been the creation of new datasets and innovative indicators, that allow examining educational systems and their achievements through a different lens.

What this means, is that it is now possible to examine the links between different kinds of educational systems in different parts of the world and the issue of medium of instruction. In such an examination, the influence of the history and purpose of those educational systems deserve to be acknowledged. Therefore, instead of Trow's original categorization of 'elite', 'mass', and 'universal' systems of higher education, I now propose a categorization between systems that I call 'colonial' and those I call 'decolonial'. In between are those systems that can be said to be in transition. It should be noted that this use of the terms 'colonial' and 'decolonial education' is somewhat different from the way in which they are commonly used. Thus, Kelly and Altbach (1984) define colonial education as an attempt 'to assist in the consolidation of foreign rule'. Studies examining colonial education often focus on the content of that education and on the medium of instruction. Foreign rule in the formal sense has ended for the countries mentioned in this article. However, the challenge of overcoming the legacy of colonial education remains, leading to pleas for the decolonization of education. These pleas have usually focused on the medium of instruction in education and on the content of that education (Prah, 1998). Here, instead, the focus is on the two features of educational systems as such that I have identified above (inefficiency and low participation).

In developing this categorization, I have used secondary data, combining four data sets for all 120 countries with a population of over 1.5 million[4] for which such data are available:[5]

- Data on the main language(s) spoken in those countries – for the most part, I have made use of what is common knowledge here; for some very multilingual countries, I have added 'others' to the list of languages.
- Data on the language(s) used as medium of instruction in higher education. This information was taken from the World Higher Education Database, as maintained by the International Association of Universities in collaboration with UNESCO.

Combined, this gives three categories of countries: those in which the main language is also the medium of instruction in higher education (denoted in green in the country labels in Graph 1 below); those in which the main language is *one of* the mediums of instruction, alongside other languages (countries with yellow label); and those countries in which a medium of instruction is used that is not one of the main languages spoken in the country (in orange).

The other two datasets are:

- The Gross Enrollment Ratio (GER) in Tertiary Education,[6] used as a measure of the overall participation in education in a country; and
- The World Bank Learning Poverty indicator, used as a measure of a country's efficiency in education.[7]

This last indicator deserves some further explanation. This indicator, launched in 2019, 'measures the proportion of children who are unable to read a simple text with comprehension by age 10. (…) [It] is calculated by combining the share of primary-age children who are out of school with the share who are in school but have not achieved this minimum proficiency in reading by the end of primary' (World Bank, 2022, 19). However, today, in most countries of the global South, all or nearly all children at least make a start with primary education, although not all complete it. Thus, it is justifiable to use this as an indicator for the *efficiency* of an educational system.

The learning poverty indicator is relevant because of the relationship between the efficiency of the educational system and colonialism. Under colonialism, the aim was never to educate the whole population – 'Education for All', as specified under UN Sustainable Development Goal number 4, was never part of colonial thought. Instead, the aim of colonial systems was to recruit a very small group of cadres who would be instrumental in solidifying colonial rule. In order to do that, only a proportion of the most talented children were selected. The selection mechanism was simple: children were offered substandard education, using the colonial languages as medium of instruction, and those who managed to learn in spite of the obstacles put before them were then selected for further education. The fact that the other children did not learn much of use to them was seen as irrelevant because those children would still be taught all they needed in their communities. In short: *inefficiency* was a hallmark of colonial systems of education.[8]

Taking these four datasets together leads to graph one, above. The country codes in the graph are the ISO 3166–1 alpha-2 codes[9] (the codes also used for internet country domain names). As mentioned above, green countries use their main language as medium of instruction in tertiary education, countries in yellow use both the main language and at least one other language, and countries in orange do not use their main language(s) as medium of instruction.

Some data in this graph deserve special mention.

Firstly, note that there are no countries completely without learning poverty – the range is from 1.4 % (the Netherlands) to 98.5 % (Zambia).[10] In part, this is an indicator of the fact that language learning abilities are not distributed equally over a population (Li, 2016). Even the *best* educational systems in the world do not manage to give *all* children a minimum reading proficiency by age 10. On the other hand,

[3] This proportion is known as the Gross Enrollment Ratio (GER) in education. The term GER is used in the rest of this article.

[4] The educational situation in countries with lower population numbers is difficult to compare; for example, in many of these countries, tertiary education is taken abroad for large portions of the student population.

[5] https://www.whed.net/home.php

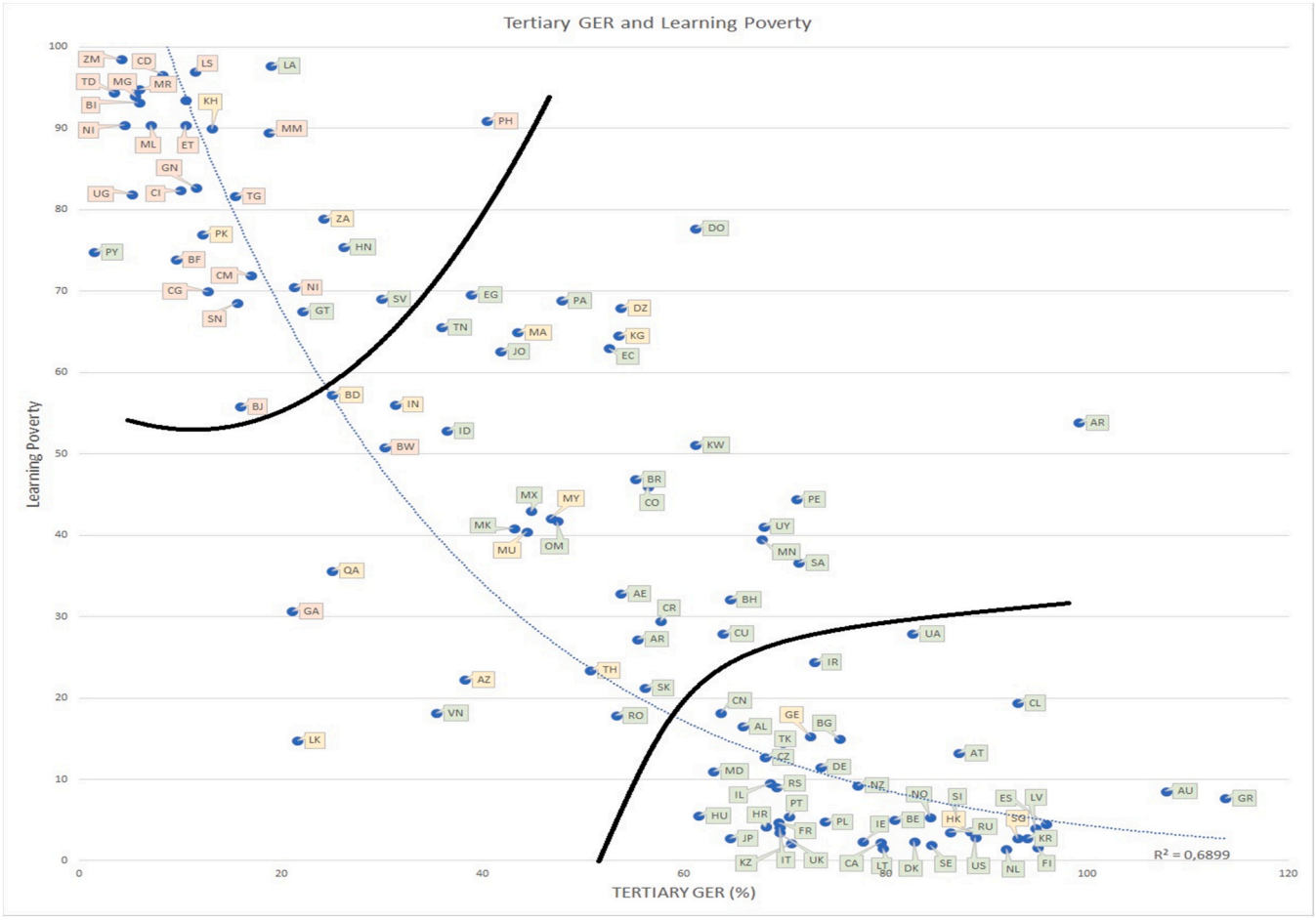
[6] GER data on tertiary education are published by UNESCO at http://sdg4-data.uis.unesco.org/. In order to include as many countries as possible in the dataset, data from 2012 to 2022 have been used. For some countries and years, the GER may be above 100 (in case many students outside of the 20–24 age group are enrolled in tertiary education). For those countries, the lowest figure has been used; for all other countries, the highest figure has been used.

[7] https://datacatalog.worldbank.org/search/dataset/0038947. In order to include as many countries as possible in the dataset, data from 2001 to 2019 have been used. For all countries, the lowest figure has been used.

[8] One might also argue that colonial systems were very efficient, in that they managed to recruit the right people at minimal cost. However, efficiency here is not seen as a measure of how one can recruit the most gifted children at minimal cost, but rather as a measure of how the maximum learning benefit can be provided to all children who enter an educational system.

[9] https://www.iso.org/obp/ui/#search

[10] In Zambia, children do go to primary school: the GER for primary education in 2017 stood at over 98 %. UNESCO data can be accessed via http://data.uis.unesco.org/#



Graph 1. Learning poverty, tertiary GER, and Medium of Instruction.

some children do learn, in spite of the fact that the educational system they are exposed to is grossly inefficient.

Secondly, note that the correlation is not 100% - there is scope here for agency – countries can influence these figures using smart policies. In the graph, countries to the left of the trendline perform better than might be expected, and those to the right do worse. Thus, the Philippines and Vietnam have a similar GER in tertiary education; however, learning poverty in Vietnam, where Vietnamese is the medium of instruction, is much lower than in the Philippines, where English is the medium of instruction (less than 20 % versus more than 90 % learning poverty).[11]

The data shows the categorization described above, which can now be specified in somewhat greater detail:

- Colonial systems (top-left-hand side of the graph): tertiary GER typically below 30%, learning poverty typically above 60%. In these systems, currently still prevalent in Sub-Saharan Africa, the medium of instruction is usually the former colonial language. In other continents, the national main language is sometimes used (Laos, Paraguay, and the countries in Central America), but not always. In some cases, such as in Cambodia and Pakistan, a combination of indigenous and other languages is used.
- Decolonial systems (bottom-right-hand side of the graph): tertiary GER typically above 60 %, learning poverty typically below 30 %. In these systems, prevalent in the global North, the medium of instruction is normally a designed language close to the mother tongue of most speakers. All these countries use the main indigenous languages as medium of instruction, with the exceptions of Georgia, Hong Kong, and Singapore. In Georgia, Russian is used in addition to Georgian. In Hong Kong, Mandarin and English are used in addition to Cantonese. Perhaps the most significant exception is Singapore. In Singapore, English is one of the main languages spoken in the country; it is also the only language used in tertiary education. I will return to the significance of this later.
- In between these two groups are the educational systems in transition: tertiary GER as well as learning poverty typically between 30% and 60%. In these systems, prevalent for example in North Africa, a combination of languages is often used: local languages are being used increasingly, but colonial languages are also still used as medium of instruction.

4. Towards decolonial systems of education

The picture in Graph 1 represents a point in time – basically combining data from the last decade. However, in order to understand the development of educational systems and the policy options open to different countries, it is important to realize that the education sector is very dynamic. What is especially relevant is that enrollment has increased considerably over the past decades (just about everywhere in the world), leading to changes in the function of education. Graph 2 below, taken from Van Van Pinxteren (2022: 64) shows the evolution in

[11] Many factors could be involved in understanding these differences, such as GDP per capita, differences in the linguistic ecology of countries, differences in funding for education or policy choices countries make. A full exploration of these falls outside the scope of this article.

tertiary education GER in selected countries over the past 50 years, illustrating this point.

What can be seen from the graph is that in several countries, enrollment has expanded considerably in a relatively short time, in some cases doubling in the space of a decade. For countries in the global North, such as Denmark and South Korea, this can obviously not be repeated: in those countries, a great majority of youngsters receive some kind of tertiary education. In the global South, the situation is drastically different: there, further expansion in GER is to be expected.

What does that mean for the medium of instruction? Unfortunately, there is hardly any research that shows what educational systems, in general, are able to achieve. However, an EU survey shows what secondary education systems in Europe are able to achieve. Table 1 below is adapted from the results of the First European Survey on Language Competences (2012: 9). It shows the percentage of students with at least a B2 proficiency level[12] in English as a second language at the end of secondary education. The B2 proficiency level in a language is generally considered to be the minimum level needed in order to be able to take tertiary education in that language.

The table shows a wide range in the levels different systems in Europe are able to achieve, going from 5 % for France to 57 % for Sweden. Van Pinxteren (2022: 75) has used the Estonian educational system as a benchmark and advanced as a working hypothesis that "there is a 'language barrier' approximately at the level of a GER of 40 % for the highest level of secondary education and at the start of tertiary education. Below this level of enrollment, any language can be used as a medium of instruction. Above this level, a switch to a designed language that is close to (one of the) discerned mother tongue(s) becomes necessary." Put differently: there are inherent limitations to what even the best educational systems in the world are able to achieve in terms of second language teaching. Because of this, it is a fiction to think that educational systems will be able to expand indefinitely using a medium of instruction that is very different from the L1 of students. Comparing Table 1 with Graph 2 above offers one possible explanation for why countries such as Denmark, Romania, and South Korea do not use English as medium of instruction in tertiary education: the GER is so high that it will be impossible for their educational systems to provide all students with the required level of proficiency in English.[13]

If we examine Graph 1 , we see that in general, a foreign medium of instruction is related to low participation in tertiary education (low GER in tertiary education). Yet, there are several exceptions. Thus, the Philippines has a tertiary GER of just over 40, yet it does not use the main language(s) spoken in the country as medium of instruction, opting for English instead. However, learning poverty in the Philippines is very high, above 90 %. What this means is that the Philippine educational system is in essence still colonial. Even though the Philippines manages to give tertiary education in English to a (relatively high) minority of the population, the primary education system is highly inefficient: it may serve those who manage to learn in spite of the obstacles put before them, but it fails the majority of primary school pupils.

Table 1
percentage of students at B2 proficiency level in English at the end of senior secondary education, selected European countries.

Country	% at B2 level
Bulgaria	19
Croatia	23
Estonia	41
France	5
Greece	26
Netherlands	36
Poland	15
Portugal	15
Slovenia	29
Spain	13
Sweden	57

Almost all countries with a tertiary GER above 60 at least use one of the main languages as medium of instruction. The most significant exception is Singapore, where English is the sole medium of instruction at tertiary level, even though English is not the main language spoken in the country and even though learning poverty in Singapore is very low (under 3%). There are no other countries that have been able to perform a similar feat. An explanation of the reasons for this would fall outside the scope of this article, but factors include the nature of Singapore as a country of immigrants, where most Singaporeans born after 1965 are bilingual, at least in the local colloquial variety of English known as 'Singlish'[14] (Wang, 2020: 99). Added to that is a very active and consistent education policy that starts teaching English from Kindergarten upwards. This suggests, as Wang (2020) does, that the reasons for Singapore's atypical success are to be found in a unique blend of factors that would be almost impossible to replicate elsewhere.

It is to be expected that over the next few decades, more and more countries will manage to expand and upgrade their educational systems. Botswana, with its relatively high GER of 30 % and its relatively low learning poverty of 51 % seems closest to the 'language barrier' mentioned above: as the country's educational system expands, it can dramatically reduce learning poverty by introducing one or more local languages as medium of instruction, as argued by Chebanne and Pinxteren (2021). The graph itself also suggests this: most countries cluster at either end of the spectrum. What this means is that a transition from using a colonial language to using indigenous languages can lead to a reduction in learning poverty over a short period of time. If that were to happen in Botswana, it is likely that other African countries will follow suit. This will mean that countries not only decolonize their curricula but also democratize participation, in line with SDG 4 and in a clear break with the colonial era. However, what could be some rational principles that could guide such a transition?

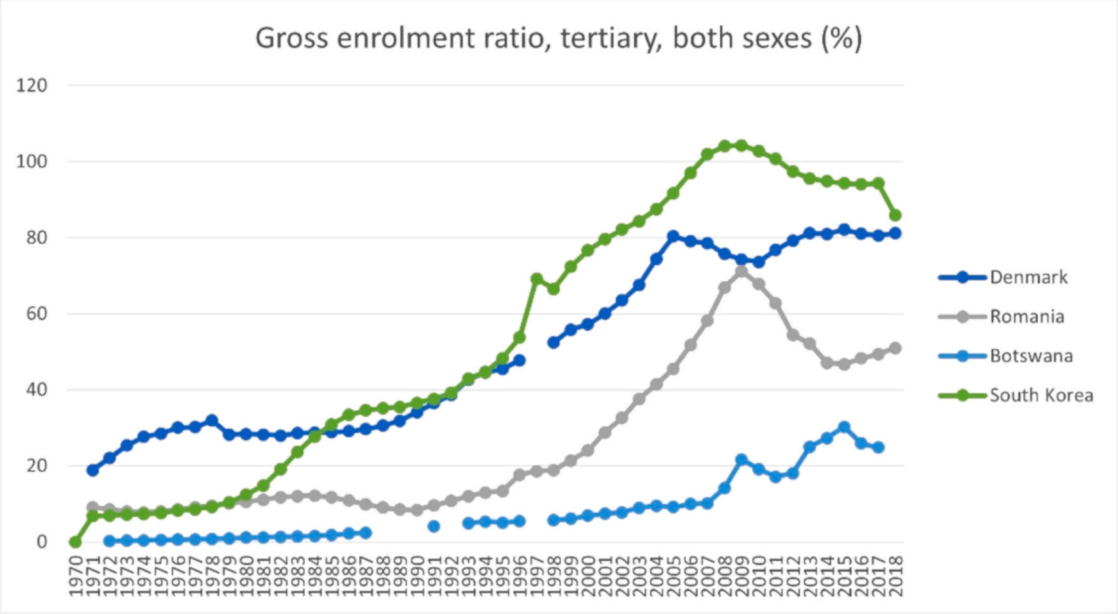
5. Rational policy options

Changing medium of instruction is not easy; it can easily go wrong. Bamgbose (2000) describes how sometimes reforms are proclaimed but never implemented or not properly implemented. Altinyelken et al. (2014) describe how, in Uganda, local languages were introduced as medium of instruction in the rural areas, but English was kept in the cities – naturally leading parents in rural areas to assume that their children would only be receiving second-rate education (pp. 93–94). In other countries, such as Madagascar, foreign languages were kept as the medium of instruction in expensive private schools, which were then frequented by the children of the elite – leading to the same consequence (Chaudenson, 2006: 29). Mufwene (2022) discusses a number of relative successes and failures and points to two key factors that may influence the success of a language policy. One of these is that policies should be consistent with existing language practices that are already in place. Languages that already have currency as a 'lingua franca' should be used, not in their 'pure' or pristine form, but in a form that is close to the actual usage people already make of it. The other important factor is

[12] This is the higher of the two 'independent user' levels as defined by the Common European Framework of Reference for Languages (CEFR), see https://www.coe.int/en/web/common-european-framework-reference-languages/table-1-cefr-3.3-common-reference-levels-global-scale accessed 29 June 2023.

[13] In addition, of course, these countries were never colonized or not colonized in the way countries of the Global South were; therefore, they were not hindered by the specific linguistic colonial heritage in developing their systems of education.

[14] See the Electronic World Atlas of Varieties of English for a description: https://ewave-atlas.org/languages/57 accessed 28 June 2023.



Graph 2. Tertiary GER evolution, selected countries.

economic. People should derive tangible benefits from the effort required for learning any language, 'including being able to attend adequate schools in a language they speak fluently or can learn well in a short time, having access to adequate health care in the same language, being able to interact with their nation's administration and security systems without the mediation of interpreters, and, among others, not being automatically disqualified from some jobs for which they are academically qualified for not speaking the official language or (regional) lingua franca of employment.' (Mufwene, 2022: 16).

This discussion already points to one important principle proposed by Van Pinxteren (2022): *designed* languages for use in formal domains should be chosen in such a way that they are easy to learn for as many speakers of discerned languages as possible. This should lead to the selection of a limited number of such languages. In order to achieve that, the system should be designed to contain incentives for linguistic collaboration, especially for related linguistic communities. Special care should be taken to protect the position of linguistic and/or cultural minorities: designed languages should be chosen in such a way that minorities can manage to learn them as well with relatively low effort. In communities where there is widespread bilingualism, that should be seen as a resource, justifying the choice for a more limited set of languages.

There is no point in proclaiming a transition without proper consultation and preparation: it requires expert linguistic advice, a national debate, and a long preparatory process, involving preparing materials, teacher training, training of interpreters, etc. This is a difficult task – but not impossible. The rewards in terms of accelerated human capital development are likely to be enormous and the alternative is continuing with an educational system that is less and less efficient and that will lead to more and more frustration, failure, and social unrest.

6. Discussion: other factors

As Graph 1 shows, colonial education systems are characterized by a combination of low GER and high learning poverty. Decolonial systems, on the other hand, combine high GER with low learning poverty. In this article, we have pointed to the relationship with medium of instruction, arguing that a shift from former colonial to indigenous languages will be helpful in overcoming learning poverty. However, the literature points to other relevant relationships. Two of these deserve to be discussed: economic factors and cultural factors.

Economic factors have been analysed in detail by Crouch et al. (2021). They conclude that differences in performance of educational systems are related to wealth, but that other factors are more important. They call this 'systems-related' inequality: in other words, inequality that is a result of deficiencies in the educational systems themselves, rather than a result of global differences in wealth. They point to the role of language as part of these inequalities: 'children whose first language is not the language of instruction in school, may be systematically disadvantaged by the curriculum and/or by teachers' beliefs and behaviors'. They recommend: 'Discrimination linked to inappropriate curricula, language, and teacher/school expectations needs to be addressed directly.'.

In other words, there is *some* relationship between a country's wealth and the achievements of its school system. However, this is not absolute: at the same level of wealth, some countries manage to do considerably better than others. One of the factors involved in this is certainly the medium of instruction.

King et al. (2023) have examined the relationship between learning poverty and culture, making use of Hofstede's cultural dimensions theory (Hofstede et al., 2010). They find a relationship between certain cultural dimensions and learning poverty; correlations (r) were just above 0.3. Such a relationship may indeed exist; however, the direction of causality may go in two ways: it could be that a history of colonial domination fosters cultural change in the direction of short-term thinking and high power distance. If culture is a factor, it is also not clear how to influence it; would changes in education lead to changes in culture, or is it the other way around? A different issue is the relationship between elite and mass cultures: Prah (2010) has pointed to the dichotomy that exists in many African countries between an elite that is educated in a former colonial language and oriented towards the West and the masses that are not. In Prah's view, using indigenous languages is key to overcoming this dichotomy.

7. Conclusions

The aim of this article was to introduce a systems-oriented approach to researching student performance in relation to medium of instruction. We wanted to re-examine the relationship between medium of instruction and the performance of educational systems, as well as the nature of

that relationship. The working hypothesis formulated in the introduction was that a medium of instruction that is the same as or close to the mother tongue of students will generally mean better education and higher participation in education. The analysis presented in the rest of the article supports the validity of this hypothesis.

In section two, it was clarified that education always involves a formalized or *designed* form of language, that is different from the speech register of learners. However, in order to be efficient, it would in general be advisable if education systems use a designed language that is closely related to the discerned language or languages already known to children as they enter the educational system.

Section three expanded on earlier work by Trow, by proposing a new classification of educational systems, based on one indicator for participation in education – the GER in tertiary education – and one indicator for the efficiency, especially of primary education: the World Bank's learning poverty indicator. This was combined with data on main languages spoken in various countries and the medium of instruction in tertiary education into Graph 1. Data from 120 countries shows a strong correlation of .69 between GER and learning poverty. Countries with low GER and high learning poverty generally use former colonial languages as medium of instruction; I have called these colonial education systems. On the other hand, countries with high GER and low learning poverty generally use their own main indigenous languages as medium of instruction. I have called these decolonial systems; in between are transitional education systems.

These transitional systems are interesting because, as section four shows, education systems the world over are dynamic. Increases in enrollment lead to changes in the function of education and, at some point, will force a transition in the medium of instruction. As section five argues, such a transition is difficult, but not impossible to achieve. It can be guided by a number of rational scientific principles that make equitable solutions a possibility. However, it requires expert linguistic advice, national debate, good planning, and a sustained commitment. However, the alternative (letting things run their 'natural' course) is not attractive – because it is sure to lead to increasing wastage, frustration, and social tensions.

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