

# A Baseline Study on the Effectiveness of a Mentor Certificate Programme Leading to Induction Activities for New Teachers in Rwandan Primary Schools

RESEARCH COMMISSIONED BY VVOB EDUCATION FOR DEVELOPMENT

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Sofie Cabus<sup>1,2</sup> Carla Haelermans<sup>3</sup> Ilse Flink<sup>4</sup> Andrew Gasozi Ntwali<sup>5</sup> Jef Peeraer<sup>5</sup>

## Abstract

Rwanda faces particular challenges with regard to teacher subject and pedagogical content knowledge and teacher retention. This paper presents a baseline study of an experiment (RCT) with a mentor certificate programme that should lead to induction activities in Rwanda. These induction activities imply mentoring and monitoring activities for newly qualified or newly appointed teachers. Questionnaires were administered among a sample of 719 new teachers across 6 Districts in Rwanda in March 2019. Of these respondents, 412 teachers have a mentor that takes part in the mentor certificate programme in the year 2019, developed by VVOB in partnership with the Rwanda Education Board, and the University of Rwanda College of Education.

The objective of this baseline study is to assess the baseline status of primary outcome measures for the intervention and control group and test for any differences between the two groups. The primary outcome measures are job satisfaction, work related needs satisfaction, job stress and burnout, teacher efficacy and motivation. Furthermore, the baseline results on these outcome measures are described.

This baseline study shows that overall treatment and control groups are very similar on pre-treatment characteristics and on the baseline outcome measures.

**Keywords:** Baseline Study; Mentor Certificate Programme; Induction Activities; RC.

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<sup>1</sup> Corresponding author ([sofie.cabus@kuleuven.be](mailto:sofie.cabus@kuleuven.be))

<sup>2</sup> KU Leuven, Research Institute for Work and Society (HIVA), Parkstraat 47 bus 5300, 3000 Leuven, Belgium.

<sup>3</sup> Maastricht University, School of Business and Economics (SBE), PO Box 616, 6200 MD, Maastricht, the Netherlands.

<sup>4</sup> VVOB Rwanda | Education for Development, KG 565 St, Kigali, Rwanda.

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## List of abbreviations

CBC	Competence Based Curriculum
CPD	Continuous Professional Development
MT	Mentor Trainers
NT	New teachers
NT Mentors	New teachers' mentors
NQT	Newly qualified teachers: per definition recently graduated from TTC
NAT	Newly assigned teachers: not per definition recently graduated from TTC, but recently assigned to a new school
REB	Rwanda Education Board
SBM	School Based Mentor
SSL	School Subject Leaders
TTC	Teacher Training Centre
URCE	University of Rwanda - College of Education

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## 1 Introduction

This paper presents a baseline study of a Randomized Controlled Trial (RCT) with a mentor certificate programme that should lead to induction activities in Rwanda. Rwanda faces particular challenges with regard to teacher subject and pedagogical content knowledge. For example, Maniraho & Christiansen (2015) collected data from 19 teachers from 19 different Rwandan schools and tested their mathematics content knowledge. The authors indicate poor results for basic mathematical skills (algebra, geometry and probability/statistics). Further, they find that teachers' level of education did not improve math performance.<sup>5</sup> To improve the quality of education and consequently student learning outcomes, The Rwanda Education Board (REB) introduced a new curriculum in 2015 called the Competence Based Curriculum (CBC) (REB, 2016). The CBC focuses on knowledge creation and application rather than just the acquisition of knowledge and skills (Ngendahayo & Askill-Williams, 2016). The CBC has direct implications for teachers' teaching practices. It requires teachers to teach differently (i.e. student-centred teaching methods instead of knowledge-based methods), to work with new learning materials and to apply new assessment methods. If there is little support for teachers in adapting these new teaching practices, this is likely to have an impact on teacher motivation and retention.

One of the main ways that the Rwandan Ministry of Education (MINEDUC) supports teachers with implementing the CBC is through the appointment of School Based Mentors (SBM). It is the ultimate goal for every school in Rwanda to have a SBM.<sup>6</sup> The SBM plays a major role in guiding and organising school-based CPD (e.g. coaching and mentoring) and promoting reflective practice among colleagues.

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<sup>5</sup> In Rwanda, the majority of teachers obtain a diploma in secondary education in order to enter the teaching profession. A smaller group of teachers obtain a bachelor diploma.

<sup>6</sup> As early as in 2012, SBM were offered and organised by the Rwanda Education Board (REB), however, owing to recruiting problems, not every school could be offered a SBM.

Newly qualified teachers (NQT), or newly appointed teachers (NAT)<sup>7</sup>, are of special interest to the SBM, as they go through a transition period from school-to-work or from school-to-school. Throughout this paper we will refer to both NQT and NAT as new teachers by using the joint abbreviation NT. Literature indicates that these transition periods are difficult (among others, Smith and Ingersoll, 2004). In order to equip NT with the skills necessary to teach the CBC, a mentor certificate programme was introduced in 2018 as a pilot, in which mentors are taught to and stimulated to develop and implement induction activities for NT in primary schools in Rwanda. As of 2019, the programme was rolled out further over more schools. This programme is developed by VVOB in Rwanda in partnership with REB, the University of Rwanda College of Education (URCE), and the Ministry of Education (MINEDUC). The main component of the mentor certificate programme is to simulate induction activities, which consist of mentoring and monitoring activities at schools (Section 4.4). Furthermore, the effectiveness of the mentor certificate programme in initiating new induction activities is monitored by VVOB in Rwanda in collaboration with its partners in Rwanda and the University of Leuven (Belgium) and Maastricht University (the Netherlands).

The baseline study discussed in this paper refers to the period right before the introduction of the training and the subsequent new induction activities and indicates the current state of participants with regards to their job satisfaction, work related needs satisfaction, experienced job stress, self-assessed efficacy and motivation. In what follows, we discuss previous literature on induction programmes in Section 2. Section 3 discusses the context of the Rwandan education system, followed by an overview of the different components of the induction programme (Section 4). Then, Section 5 presents the research method for the evaluation of the effectiveness of the induction programme and Section 6 presents the sampling procedure. Data and descriptive statistics of background characteristics are found in Section 7. A description of

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<sup>7</sup> Teachers who face a transition to a new school after having had seniority in another school before.

the full set of pre-treatment outcome variables is discussed in Section 8. Section 9 evaluates the outcomes, and Section 10 concludes.

## 2 Literature

Previous literature indicates that teachers considerably improve performance over the first three to five years mainly owing to teachers' informal learning on-the-job (Rockoff, 2004, 2008; Hanushek & Rivkin, 2010; Hanushek, 2011). However, in these first critical years in-service, New Teachers (NT) are also more likely to leave the profession early. There are several factors that contribute to teacher attrition: (1) teachers can face a difficult integration into the new school; (2) there may be system constraints, or difficulties in finding a permanent job at the new school (i.e. the problem of frequent migration of teachers), or salary and status issues, as in some countries, like Rwanda, teachers have very low status and/or salaries.

These reasons, in turn, may negatively affect teaching practices and teacher efficacy of NT, which in turn may reduce teachers' value added, motivation and overall job satisfaction, and increase stress, emotional exhaustion and burnout (among others; Hackman & Oldham, 1975; Broeck et al., 2010; Strong, 2005; Richter et al., 2013; Cabus et al., 2019). These negative feelings towards the teaching profession can, in the worst case, trigger emotional exhaustion and burnout (Richter et al., 2013).

Smith & Ingersoll (2004) and Ingersoll & Strong (2011) discuss the important role for induction programmes to stimulate teachers' competences and to retain them on-the-job within the first years of employment. Induction programmes consist of activities for beginning teachers, mostly organised by the school and/or in cooperation with the pre-service teacher training. Examples are: mentoring and coaching, video-analysis of teachers' teaching, and peer observation and discussions (Maandag et al., 2007; Algozzine et al., 2007; Davis & Higdon, 2008; Roehrig et al., 2008; Wang et al., 2008).

From the literature it is clear that especially mentoring activities are important for teacher retention. A mentor is often a more experienced colleague at the school of the new teacher (Ingersoll and Smith, 2004).<sup>8</sup> This mentor offers support to the new teacher in, for example, subject or pedagogical content knowledge and class management, and introduces the new teacher to the school and his/her new colleagues. However, there are some conditions attached to who the mentor is, for example: a mentor should be a person that the new teacher can trust; the chosen mentor should stay appointed for more than one year; and the mentor should have a professional attitude towards the mentoring activities (Evertson & Smithey, 2000; Cohen & Fuller, 2006; Fletcher & Strong, 2009; Smith & Ingersoll, 2004; Strong, 2005; Odell & Huling, 2000; Stanulis & Floden, 2009). Further, there are requirements attached to the assignment of the mentor. Based on a systematic literature study, Cabus et al. (2019) argue that mentoring programmes are more effective in case of higher frequency, longer duration, and better quality. But how frequent and how long a mentoring programme should run in order to be effective remains largely unclear. With regard to mentoring quality, Richter et al. (2013) indicate that mentoring and coaching of NT should aim at knowledge transformation rather than at knowledge transmission. Knowledge transformation is defined as a learning process that attaches new knowledge to prior knowledge of the mentee, in this case the new teacher.

### 3 Context

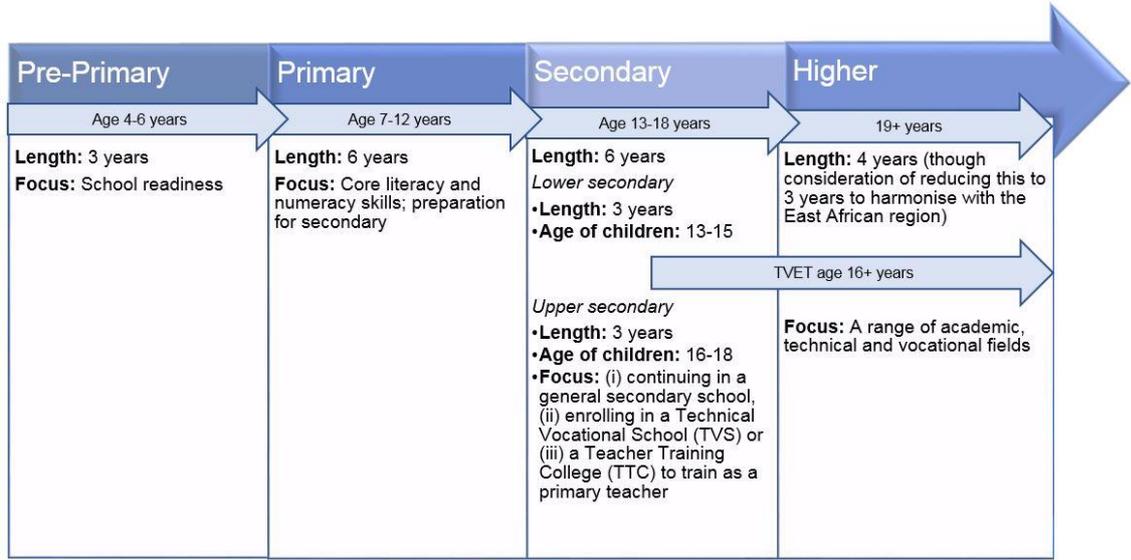
Similar to other countries, the formal education system in Rwanda has four main levels or sub-sectors: pre-primary, primary, secondary, and higher education. This report focuses particularly on primary education.

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<sup>8</sup> According to the definition of Ingersoll and Smith (2004, p.683), mentoring is defined as: “[...] *the personal guidance provided, usually by seasoned veterans, to beginning teachers in schools.*” We elaborate on this definition by also including experienced teachers into the target group for mentoring activities, who recently started in a new school.

Compulsory education takes 12 years, where children's age normally ranges from 7 to 18. Compulsory education covers primary education, lower and upper secondary education (MINEDUC, 2017). There are national examinations at the end of primary, lower secondary and upper secondary education that determine eligibility for proceeding to the next level of education. The language of instruction in primary grade 1 to 3 (P1-P3) is Kinyarwanda, and changes to English as of primary grade 4 (P4). Figure 1 shows the structure of the Rwandan formal education system, including pre-primary education.

Figure 1: Structure of the Rwandan education system

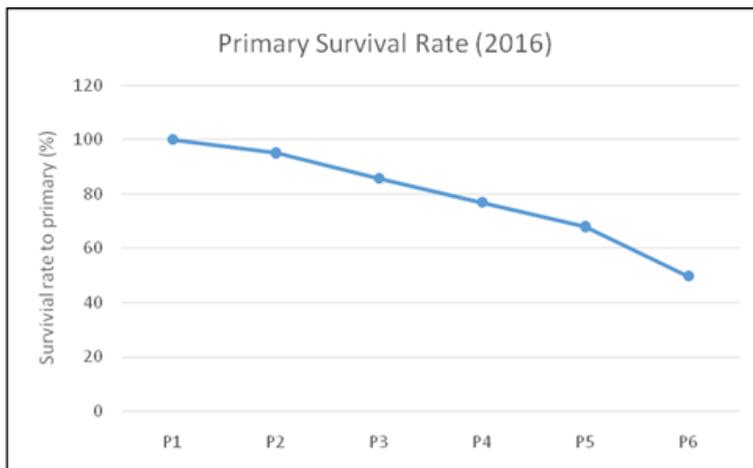


Source: Figure 1 – Structure of the Rwandan educations system in MINEDUC (2017) Education Sector Strategic Plan 2018/19 to 2022/23 final draft 3rd October 2017, pp 14.

Because Rwanda is committed to providing free education for all children aged 7-18, access to education has increased significantly in the early 2000s. Accordingly, enrolment rates in primary education in Rwanda have been quite high since 2012, with 97.7% of children enrolled in P1 in 2016 (MINEDUC, 2017). However, many children in primary education are not within

the expected age range owing to grade repetition and dropout. Figure 2 plots the survival rates (Y-axis) over the primary school grades (X-axis) and indicates that by primary grade 6 (P6) only about 50 percent of children are still in school. This implies that throughout their primary school career, many primary pupils drop-out.

Figure 2: Survival rates in primary education in Rwanda in 2016.



Source: Figure 5 in MINEDUC (2017) Education Sector Strategic Plan 2018/19 to 2022/23 final draft 3rd October 2017, pp 22.

Although access rates to primary education are quite high, the quality of education remains a serious challenge. We identify three indicators of the quality of education: learners' basic literacy and numeracy skills, pupil-teacher ratio, and the proportion of adequately trained teachers. First, quality can be expressed in mastering basic literacy and numeracy skills. In fact, to successfully progress through primary, secondary and tertiary education, and to be able to master technical and vocational courses, it is necessary to have a strong basis in literacy and numeracy, which is not the case for many students. In 2011 and 2014 an assessment of the learning achievements was conducted in Rwandan schools in order to provide an overview of the levels of learning in literacy and numeracy of children in primary grade 2 (P2) and primary grade 5 (P5). In 2014, the results showed that respectively 45.3% and 32.9% of P2 students achieved the grade level competency in literacy and numeracy. In P5, these proportions largely

remained unchanged ( 44.1% and 38.3% in P5, for literacy and numeracy, respectively). Pupils from urban schools did perform better than those in rural schools, and learners in private schools performed better than their peers in public schools (government schools) (MINEDUC, 2017).

Second, the pupil-teacher ratio in primary education in Rwanda – an often used indicator of the quality of education (Glewwe et al., 2011) - is as high as 58:1. What is more, the ratio of pupils per qualified teacher is 62:1 (with a target of 48:1 for 2017/18) (MINEDUC, 2017). Note nonetheless, that there is large variation in the average class size and pupil-teacher ratios across and within districts within the country. To lower the pupil-teacher ratio, Rwanda has introduced the double-shift system. The double-shift practice entails that teachers educate a different group of students in the mornings and afternoons, implying that students only get education half a day, but teachers work full day shifts.

Third, the quality of education can be indicated by the number of adequately qualified teachers in service (MINEDUC, 2017). One of the key educational challenges in Rwanda is that teachers lack the required competencies in subject content, pedagogy and language of instruction (English and Kinyarwanda). About 93% of teachers is qualified, however, in practice quality between teachers varies (MINEDUC, 2017). We also present evidence on this in Section 7.

## **4 Intervention**

### **4.1 Short background**

In close collaboration with REB, the Ministry of Education, and URCE, VVOB introduced a pilot of a mentor certificate programme in 2018, which subsequently would have to lead to new induction activities for NT (NQT and NAT) in primary education in Rwanda. This pilot was simultaneously researched, and in 2019 further rolled out in more schools, and again researched. NQTs are in the first 3 years of their teaching career after leaving pre-service

teacher education, while NATs have a maximum of 3 years teaching experience in their newly assigned school. The induction activities that the mentor certificate programme focused on consist of *mentoring* and *monitoring* activities. The *mentoring* activities consist of an individual learning plan that is put together by the NT and his/her mentor. The learning plan is essentially a bundle of activities that include formal one-to-one mentoring (e.g. on pedagogical and subject content knowledge), and discussions with peers through a community of practice. These activities take place on average two times per week. Then, three times per year, a tutor of the pre-service teacher training centre (TTC) *monitors* the NT by observing his/her teaching practice and providing feedback. Potential problems with the mentor can also be discussed with the TTC tutor.

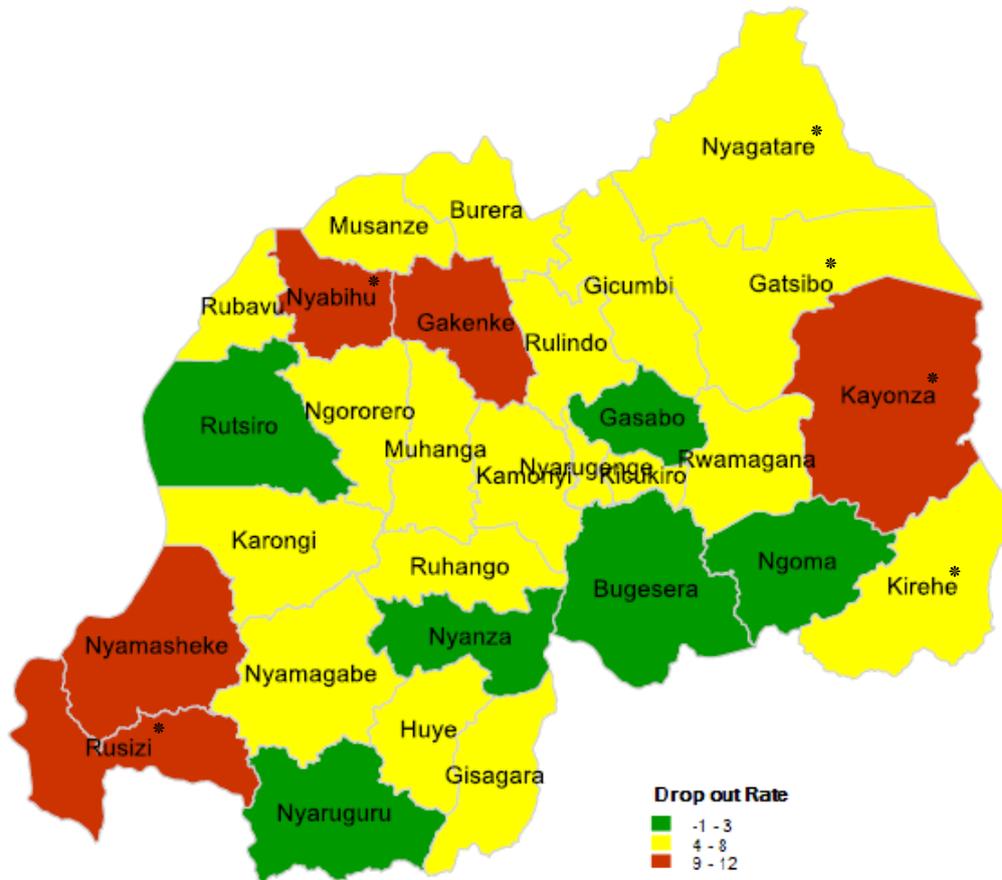
#### **4.2 Delivery of the induction programme**

This implementation of the mentor certificate programme and subsequent induction programme started with a pilot in the year 2018. To measure the effectiveness of the pilot programme, VVOB, URCE, REB and the Universities of Leuven and Maastricht established a research programme. In 2019, the programme was rolled out in a larger amount of schools. The induction activities at school are organized by School-Based Mentors (SBM), School-Subject Leaders (SSL) and Tutors from the Teacher Training College (TTC), who are all trained in educational coaching and mentoring through certified CPD Programmes from the University of Rwanda College of Education, co-developed and -implemented with VVOB. More information on the CPD certificate programmes is provided in section 4.3.

The induction programme is implemented in 6 districts in the Western Province (Nyabihu and Rusizi) and Eastern Province (Nyagatare, Gatsibo, Kirehe and Kayonza) of Rwanda (Figure 3). These districts have higher dropout rates and lower examination results than on average observed in Rwanda (Ministry of Education, 2016) (as can be seen in Figure 3 based

on the colours; red districts have high drop-out rates). In total 275 school-based mentors are trained in the year 2019, implying that the induction programme will be introduced to all NTs in these primary (intervention) schools in Rwanda.

Figure 3: Country map with location of interventions ( \*)



Source: 2015 Educational Statistical Yearbook, Ministry of Education (2016), p.31

### 4.3 CPD certificate programme

The support and guidance (including mentoring) provided to NTs in the induction programme is about building the teaching profession, retaining teachers in the profession, and ensuring that they are part of a learning community focused on continuously improving their teaching practice and their learning. The induction programme should be considered part of the School-Based Mentorship Programme Framework (SBMPF). A School-Based Mentor (SBM)

has been selected in each public/government aided school to facilitate the SBMPF implementation.

In this context, VVOB, REB, and URCE, have developed a CPD certificate programme for School-Based Mentors (SBM), School-Subject Leaders (SSL) in mathematics and TTC tutors. TTC tutors co-facilitate the delivery of induction programme and support SBMs and SSLs (NTs mentors in schools) in their mentoring of NTs. The TTC tutor also establishes a link between the pre-service and in-service teaching training. This is in line with Policy Priority 4 of the draft TDM-policy, which stipulates that CPD of teachers and pre-service teacher education must be more closely linked.

The CPD certificate programme on Educational Mentorship and Coaching provides SBMs with coaching and mentoring skills needed to guide and organize CPD at their school, to promote reflective practice in their respective schools and to advance the implementation of the CBC. It focuses on teacher development as an ongoing process in a teacher's career. Throughout this paper, the person, who has followed the Educational Mentorship and Coaching programme, will be called the new teachers' (NT) mentor.

There is also a CPD certificate programme for SSL in mathematics. The programme aims to boost basic mathematical skills among teachers, and is essentially a certificate course for SSL in mathematics. SSL are introduced to a variety of aspects of pedagogical content knowledge on mathematics and mathematical leadership. It also contains examples related to selected topics of the primary mathematics curriculum, in order to mentor NT who teach mathematics.

TTC tutors also follow the CPD certificate programme on Educational Mentorship and Coaching organised by REB. They receive additional training on monitoring the performance of NT. In addition, TTC tutors will be coached by the URCE in their role as co-trainer and coach of mentors (SSL and SBM).

Given that SBMs and TTC tutors are the main facilitators of induction programmes in schools, the RCT focuses on mentoring by SBM and TTC tutors, not by the SSL.

#### **4.4 Key activities of the induction programme**

Based on research evidence on means for effective CPD, elements and success factors of induction and in alignment with the priorities and strategies of the Government of Rwanda, the induction programme in Rwandan schools should consist of four key activities, which are covered in the CPD certificate programmes. The first main activity is mentoring, which can be both one-to-one mentoring and group mentoring. Examples of mentoring activities are joint lesson planning, observing mentor's teaching or observing fellow teachers - including a discussion before (preparation lesson observation) and after observation (debriefing and reflection) - analysing students' work and results on assessments, analysing marking and record keeping system, discussing about teaching and learning issues, or suggesting and discussing teaching and classroom management techniques. The second activity is CoP sessions, where NT and more experienced teachers, teaching the same subject (depending on the size of the school) meet to discuss their work. They think of solutions to challenges they encounter in the classroom and share good practices. Activities that can be undertaken during a CoP-session are, for example, collaborative lesson preparation, lesson study/observation, case discussions, analysing student work on formative and summative assessments, analysing marking and record keeping systems, or developing strategies for teaching learners with special educational needs (SEN). The third activity are seminars or trainings on topics of concern to new teachers, which can be organised at school, sector or district level. The fourth and final activity is TTC support to NTs' induction. This can include classroom observation, analysing students' work and results on assessments or reviewing a NT's CPD-plan (review progress and setting targets) and monitoring the implementation of the induction programmes.

Note that the intervention technically is an intent-to-treat for the NTs, as, the SBMs and SSLs decide which activities actually to implement in their schools, meaning that the content, frequency and intensity of the actual activities within the induction programme vary per school, and per NT.

## 5 Research method

During the pilot study in 2018, we have set-up and tested a valuable survey tool for the measurement of the effectiveness of the intervention “induction programmes for New Teachers in Rwanda”. The survey tool measures different teacher outcomes that are expected to change when NT have access to well-designed induction programmes, namely: job satisfaction, motivation, teaching practices, teacher efficacy, and stress and burnout. The measurement instruments underlying these outcomes are discussed in Section 8. In order to measure the effectiveness of the intervention programme in terms of the aforementioned teacher outcomes, we wish to compare a treatment group with a control group before and after the intervention has taken place. To this end, we will eventually conduct a difference-in-differences (DiD) analysis. However, in this baseline report we can obviously only report on the pre-treatment measures, and the differences of treatment and control groups on these measures.

However, two different conditions apply to the treatment group. A first treatment group receives mentoring activities within the scope of the new induction programme. In the second treatment group a TTC tutor monitors the NTs’ performance in addition to the mentoring activities. Therefore, in the remainder of this paper, we distinguish between two treatment groups, namely: the mentoring group (Treatment 1) and the mentoring and monitoring group (Treatment 2).

There are a couple of assumptions underlying a DiD analysis. First, it is important that the intervention group and the control group are comparable based on observed and unobserved background characteristics. For example, teachers, who participate in the intervention should

have a similar intrinsic motivation for teaching as teachers in the control group. If this condition is met, the effectiveness of the intervention can be ascribed to the intervention and not to differences in characteristics between the treated and untreated groups.

Second, the intervention group and the control group move “parallel over time”. This parallel time trend assumption implies, for example, that teachers from the intervention have a similar likelihood to drop-out from the teaching profession than teachers from the control group. In other words: before the intervention has taken place, treated teachers have similar outcomes than untreated teachers.

And third, there is no overlap (or ‘spill-over’) between participants and non-participants to the intervention. Spill-over effects violate the stable unit treatment value assumption (SUTVA); which implies that untreated teachers benefit from the intervention through access to knowledge of or experiences with induction programmes via treated teachers.

A good way for ensuring comparability between the treated and untreated teachers, and to meet the parallel time trend assumption, is random assignment (to the intervention). Random assignment means that differences between treated and untreated teachers are based on a random error in the assignment process. The idea is that these random errors in observed or unobserved characteristics cancel each other out in the comparison of the intervention and control group before and after the intervention, so that the estimated effectiveness of induction programmes is a ‘true’ measure of the effect.

## **6 Sampling procedure**

Prior to the pilot study in 2018, all 589 schools/SBMs that were eligible to participate in the CPD certificate programme on educational mentorship and coaching were randomly assigned to three training cohorts. The first training cohort was considered the pilot group which was

trained in 2018 and included N=38 schools/SBMs. The second cohort, considered the treatment group which is trained in 2019, included N=275 schools/SBMs. The last cohort, considered the control group in this study in 2019 which will be trained in 2020, included N=276 schools/SBMs. As such, a total of 551 schools were deemed eligible to participate in the RCT. As funds did not allow to select all 551 schools for the RCT, we drew random samples from each of the two groups/cohorts. To select a sample large enough to detect a small effect of the treatment we used G-power software to calculate the sample size according to the number of NT. Based on these results, the sample size was set at 1,050 NTs, enabling the estimation of a significant small standardized effect of 0.2 (Cohen's d) with a statistical power of 0.80 (convention). Calculating this back to the number of schools, this implied selecting 231 schools (assuming at least 4 NTs per school, the average number of NTs at each pilot school). As having two treatment groups required us to have 3/2 allocation ratio for the treatment versus the control group, we selected 124 treatment schools and 106 control schools for the RCT. The treatment sample is composed of a random selection of 72 schools that are part of treatment 1 and all 52 schools that are part of treatment 2. The 106 control schools were randomly selected from the sample of 276 schools.

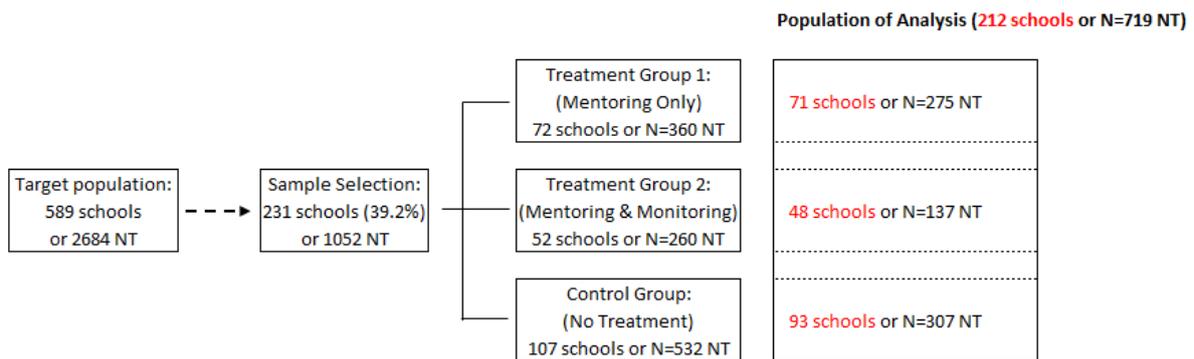
Next, enumerators went to the selected schools to interview all the NT. Given that some schools had less NT than expected, no NT at all and/or some NT did not want to participate in the survey, the final sample, and after data cleaning, included a total of 214 schools and 719 NT, which is a negligible difference from the 231 schools that we needed according to the power analysis. This includes 275 NT in treatment group 1, 137 NT in treatment group 2 and 307 NT in the control group. Figure 4 gives an overview of the design of the RCT, leading from the target population of schools to the sample that is used for analysis. In order to meet the third assumption on “no spill over effects” between treated and untreated teachers, we guaranteed that treated teachers are not teaching in control schools, and vice versa.

## **7 Data**

### **7.1 Composition of the sample**

While 760 teachers were surveyed in March 2019, the current dataset consists of 719 teachers after cleaning, since we lose 41 observations due to missing information on personal background characteristics of teachers. In total the population for analysis included, 212 schools: 71 schools (or 275 NT) in Treatment group 1; 48 schools (137 NT) in Treatment Group 2; and 93 schools (307 NT) in the Control Group. The total sample size is then equal to  $N=719$  new teachers.

Figure 4: Design of the RCT



Note: This figure represents the total number of schools and the total number of NT in the final dataset, after data cleaning. Before data cleaning, we had questionnaires among 760 NT or 116 schools.

## 7.2 Background characteristics

Table 1 summarizes the background characteristics of the sample of teachers, and the differences between the two treatment groups and the control group. We have slightly more men than women in the sample. They are on average 28 years old. Age is not statistically different between the two treatment groups and the untreated teachers. However, gender appears to be significantly different between the second treatment group and the control group. There are 10 percentage points more males in the control group than in Treatment Group 1. Educational attainment is rather poor. In the control group, we observe that 91.5 percent of teachers attained level-1. This percentage share is equal to 85.1 percent in Treatment Group 1 (which is significantly different at the 5% -level), and 87.6 percent in Treatment Group 2 (not statistically different). However, since we apply eight consecutive t-tests, we have to be cautious with the interpretation, as by statistical law we would expect every 1 out of 20 tests to be significant if we use a 5% significance level<sup>9</sup>, and indeed, we see some significant differences at the 10%-level.

<sup>9</sup> In some studies authors apply a Bonferroni correction with a large number of t-tests. However, the Bonferroni correction is a rather strict test that is undesirable and is unusual to apply to pre-treatment comparisons, as it means to account for false positives in outcomes.

All teachers teach in primary school, but 130 teachers (18%) also teach in lower secondary education. The share of teachers also teaching in secondary education varies highly by district (varying from 3 to 37 percent, with an average of 18), but within districts treatment and control groups are comparable. On average, respondents travel thirty to forty minutes to the appointed school. We observe small significant differences between the treatment groups compared to the control group with regard to travel time. However, the difference between the groups is very small (5 to 7 minutes).

*Table 1: T-test on background characteristics*

	Control group		Treatment Group 1		Sig.	Treatment Group 2		Sig.
	Mean	Std.Dev	Mean	Std.Dev		Mean	Std.Dev	
male (%)	0.570	0.496	0.564	0.497		0.474	0.501	*
age (years)	27.7	5.6	28.0	6.0		27.9	6.5	
teacher in primary vs. secondary (%)	0.84	0.37	0.78	0.41	*	0.85	0.36	
educational attainment (%)								
level-1	0.915	0.279	0.851	0.357	**	0.876	0.331	
level-2	0.049	0.216	0.065	0.248		0.058	0.235	
level-3	0.036	0.186	0.076	0.266	**	0.066	0.249	
level-4	0.000	0.000	0.007	0.085		0.000	0.000	
teaching experience (years)								
since graduation	3.4	4.0	3.5	0.3		3.4	3.9	
in this school	1.5	1.0	1.3	0.1	**	1.4	1.0	
Travel time (minutes)	39.6	36.7	34.0	30.3	**	32.5	26.8	**

Note: Stars denote the significant levels of the differences between the treatment group (1/2) and the control group. Significant levels are denoted at 1%-level (\*\*\*); 5%-level (\*\*); and 10%-level (\*). Treatment Group 1 receives mentoring only (N=275); and Treatment Group 2 receives mentoring and monitoring (N=137).

Furthermore, about 415 teachers (57.7%) have had teaching experience in no more than one school. Years of teaching experience since graduation from pre-service teacher training varies from 0 to 31 years with an average of three and a half years and a standard deviation of 4. As such, there are a few teachers with a lot of seniority, however, they got appointed to a new school fairly recently. There is no significant difference in this respect between the control group and both the treatment groups.

### 7.3 Experience with induction programmes and induction needs

One of the targets of the Mentor Certificate Programme is that it could lead to induction activities for New Teachers in Rwandan Primary Schools. In our questionnaire, we have explored more explicitly whether teachers have experiences with induction programmes, or express certain induction needs (Table 2, Table 3 and Table 4). Of the full sample of teachers, 38 percent responds to be familiar with the definition of induction programmes; 54 percent has a new teacher mentor at the school; and 17 percent has a TTC mentor. The new teacher mentor is mostly a school-based mentor (41%), but can also be the director of studies or deputy head teacher (26%); or the school subject leader (24%).<sup>10</sup> Those respondents with a new teacher mentor talk very frequently with him/her, for example, every month (23%); every two weeks (10%); once a week (24%); several times per week (15%) or on a daily basis (6%). Only 10 percent of respondents talk less than once a month with the new teacher mentor, and 12 percent never.

*Table 2: Experience with induction programmes (N=719)*

Question	Yes	No
Are you familiar with the definition of induction programmes for new teachers?	38%	62%
I took part in a professional mentoring programme at my school	29%	71%
There was an organized introduction in my school	27%	73%
I took part in general and/or administrative introduction to my school	83%	17%
Do you have a new teacher mentor at your school?	54%	46%
Who is the new teacher mentor?*		
School subject leader	24%	
Director of studies/deputy head teacher	26%	
school based mentor	41%	
Other	10%	
Do you have a TTC mentor?	17%	83%

\*Note: Answers to this question only provided for those respondents that answered ‘yes, I have a new teacher mentor at my school.’

<sup>10</sup> The remaining group of respondents (9%) answered that the new teacher mentor is “other” than previously defined persons.

More than 80 percent of teachers received a general and/or administrative introduction. However, barely one in every three respondents took part in a professional mentoring programme or an organized introduction at the school. This is also indicated by the teachers' answers on participation in activities at school. Over two-thirds of respondents have never had any activity that resorts to an induction programme, like joint lesson planning together with a mentor, classroom observation, individual coaching, developing and reviewing a continuous professional development plan (CPD), peer discussions or workshops on (the didactics of) their subject.

Table 3: Participation of respondents in induction activities at their school (N=719)

	Never	Less than once a month	Once a month	Every two weeks	Once a week	Several times a week	Every day
Joint lesson planning together with my mentor	59%	7%	12%	5%	8%	6%	3%
Observing mentor teaching	67%	6%	11%	3%	7%	4%	1%
Observing another teacher teaching	39%	13%	18%	6%	11%	8%	4%
Being observed by my mentor	48%	9%	21%	6%	9%	7%	0%
Being observed by another teacher	45%	10%	18%	5%	9%	9%	4%
Individual coaching conversation with my mentor	45%	9%	19%	6%	11%	7%	3%
Developing my individual CPD Plan together with my mentor	58%	7%	13%	6%	10%	5%	2%
Reviewing my individual CPD Plan together with my mentor	56%	8%	13%	5%	10%	5%	3%
Being part of a Community of Practice of teachers teaching the same subject	49%	12%	15%	5%	11%	6%	2%
Being part of a Community of Practice of teachers teaching different subject	46%	15%	18%	7%	8%	5%	1%
Seminars/trainings on topics of concern to new teachers	74%	8%	8%	3%	4%	2%	0%
Analysing student work and results on assessments together with my mentor	60%	8%	14%	4%	7%	5%	2%

Despite this low participation in professional mentoring activities, there is clearly a need for it (Table 4). For example, respondents wish to have formally organised support at the school in order to learn about strategies to manage large classes. Further, teachers indicate that they could benefit from organised workshops, peer discussions or discussions with a mentor at

school on didactic material, knowledge and understanding of (teaching) their subject, and administrative documents. Need for formally organised support seems to be lowest for support with student evaluation and assessment and student behaviour.

*Table 4: The degree to which respondents currently need formally organized support (N=719)*

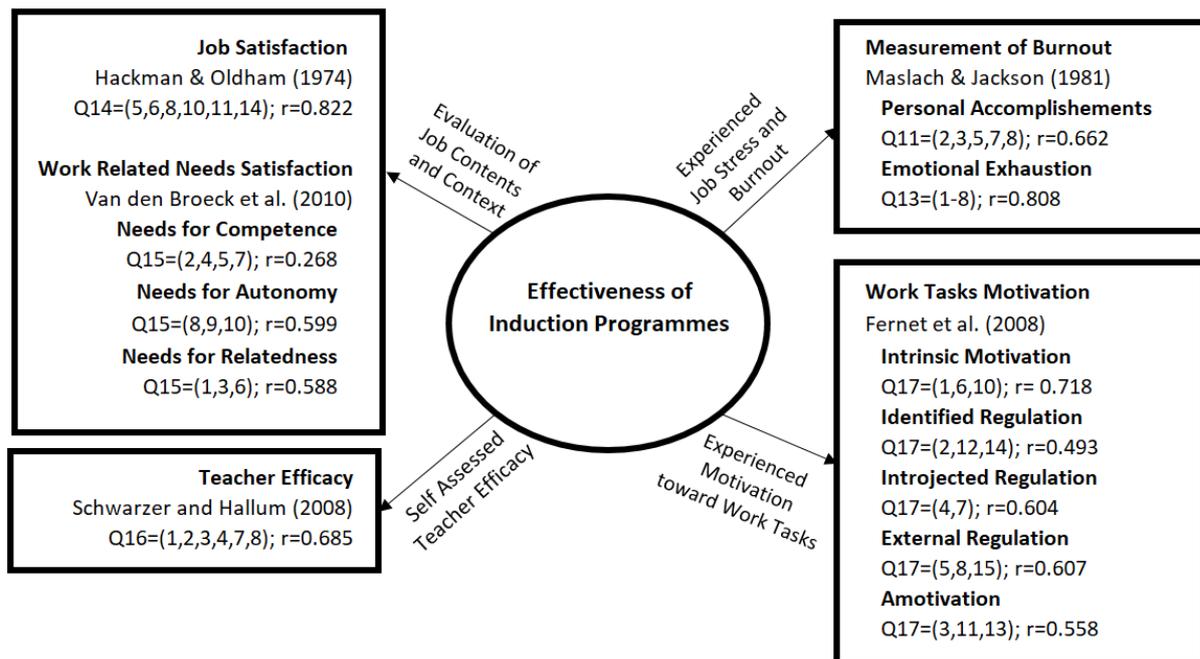
	No need at present	Low level of need	Moderate level of need	High level of need
Knowledge and understanding of my subject(s)	13%	22%	37%	28%
Pedagogical competences in teaching my subject(s)	12%	28%	35%	26%
Student evaluation and assessment	42%	22%	21%	15%
Student behavior	36%	24%	21%	20%
Strategies to manage big classes	10%	19%	27%	44%
Classroom management and administration	15%	24%	30%	30%

## **8 Description and analysis of outcome variables analysis**

### **8.1 Properties and reliability**

We used different sources from the selected literature to measure the effectiveness of induction programmes in different ways. As such, we evaluated (1) teachers’ satisfaction with job contents and context (Hackman and Oldham, 1974; TALIS, 2013); (2) work related basic needs satisfaction (Van den Broeck et al., 2010); (3) teacher efficacy (Schwarzer and Hallum, 2008); (4) job stress and burnout (Maslach and Jackson, 1981); and (5) teachers’ motivation toward specific work tasks (Fernet et al., 2008). Figure 5 summarizes these components.

Figure 5: Presentation of the components included in the Survey tool



Note: The numbers between brackets refer to those questions with the highest loadings on the components measured in a particular question (e.g. Question 14 measures Job Satisfaction), and ‘r’ denotes the reliability statistic of the scale.

### 8.1.1 Job Satisfaction

Hackman and Oldham (1974) developed a scale for the measurement of overall satisfaction and happiness with the job. Overall happiness and satisfaction is measured based on different questions related to job security, pay and other compensation, peers and co-workers (also referred to as social satisfaction), supervision, and opportunities for personal growth and development on the job (also referred to as growth satisfaction).

Table 5: Scores on the sub-questions of the scale job satisfaction

Q(n°)	Description	Score (max.5)				
		1	2	3	4	5
5	The degree of respect and fair treatment I receive from the head teacher	3%	5%	9%	45%	38%
6	The feeling of worthwhile accomplishment I get from doing my job as a teacher	0%	1%	4%	31%	64%
8	The amount of support and guidance I receive at this school	2%	7%	5%	49%	36%
10	The amount of independent thought and action I can exercise in my job as a teacher	2%	7%	7%	53%	31%
11	How secure things look for me in the future in this school	2%	4%	10%	41%	44%
14	The overall quality of support and guidance I receive at this school	3%	8%	7%	51%	31%

Note: The scores range from 1 (extremely dissatisfied) to 5 (extremely satisfied). The value of 3 indicates neutral.

Table 3 summarizes the sub-questions with the highest loadings on the scale. The reliability statistic derived from Cronbach’s alpha is equal to 0.822 based on the six questions reported in Table 3. Hereby, the scale for job satisfaction meets the generally accepted lower bound criteria of  $r \geq 0.7$ .

### 8.1.2 Work Related Needs Satisfaction

The work-related basic needs satisfaction (W-BNS) scale of Van den Broeck et al. (2010) captures three scales, namely: the need for competence (1), autonomy (2) and relatedness (3) at work. We present the reliability statistic of each of these scales in Figure 5. The reliability statistic of the needs for competency scale is poor and equal to  $r=0.268$ . For the other two scales we also estimate moderate reliability coefficients of ( $r=0.599$ ; needs for autonomy) and ( $r=0.588$ ; needs for relatedness at work).

*Table 6: Scores on the sub-questions of the scales needs for competence, autonomy and relatedness at work*

Q(n°)	Description	Scores (max.4)			
		1	2	3	4
<b>Needs for competence</b>					
2	I feel confident in teaching	1%	3%	12%	84%
4	When I'm at work I have serious doubts about whether I can do things well	17%	18%	20%	45%
5	At work, I feel capable to perform my task	0%	1%	6%	93%
7	I feel comfortable in my task as a teacher	3%	8%	23%	66%
<b>Needs for autonomy</b>					
8	I feel forced to do many things on my job I wouldn't choose to do	74%	10%	8%	8%
9	I feel a sense of choice and freedom in my job	5%	10%	23%	63%
10	I feel pressured to do too many things on my job	64%	13%	11%	13%
<b>Needs for relatedness</b>					
1	I have a good relationship with the other teachers	1%	2%	9%	89%
3	I feel the relationships (with students, teachers, parents, head teacher...) I have at work are just superficial	0%	4%	25%	71%
6	I am open to share my failures with my fellow teachers	0%	2%	5%	93%

Note: The scores range from 1 (Not at all true) to 4 (Exactly true).

Table 6 summarizes the sub-questions underlying the three W-BNS scales. With regard to the need for competence, teachers respond very differently to question 4 “When I'm at work I have serious doubts about whether I can do things well”. The responses to this question seem to contradict with the overall fair to good responses on the other questions underlying the needs for competence. Indeed, Cronbach’s alpha rises to ( $r=0.520$ ) when leaving out question 4, but this is still lower than the acceptable level.

We also observe a lot of variance in the responses to the questions on the needs for autonomy. We improve the estimated Cronbach’s alpha to ( $r=0.647$ , instead of  $=0.559$ ) when leaving out the positive formulated question on “I feel a sense of choice and freedom in my job”. However, we did not leave out this question as we need at least three questions in a scale, in order for the scale to reliably represent the overarching concept.

The questions on the needs for relatedness have been answered in favour of relatedness. Cronbach’s alpha could be improved a lot, however, to ( $r=0.668$ ) when leaving out the question on sharing failures with fellow teachers, but, as discussed above, we do not want to delete this question.

### 8.1.3 Experienced Job Stress and Burnout

In order to measure experienced job stress and burnout we have used two scales provided by Maslach and Jackson (1981). These scales are: personal accomplishments and emotional exhaustion. In particular, emotional exhaustion lies at the heart of experienced burnout (Maslach, Schaufeli, & Leiter, 2001). If burnout is present, people tend to evaluate themselves negatively and express feelings of unhappiness with their accomplishments on the job. Furthermore, burnout can lead to depersonalization (e.g. I feel I consider some students as if they were impersonal ‘objects’). Table 7 summarizes the results on the questions with highest loadings on the two scales.

*Table 7: Scores on the sub-questions of the scales personal accomplishments and emotional exhaustion*

Q(n°)	Description	Scores (max.4)			
		1	2	3	4
<b>Personal accomplishments</b>					
2	I deal very effectively with the problems of my students	1%	7%	18%	73%
3	I feel I am positively influencing children’s lives through my work	1%	3%	9%	87%
5	I can easily create a relaxed atmosphere with my children	0%	2%	11%	87%
7	I can accomplish many worthwhile things in my job as a teacher	1%	1%	9%	89%
8	In my work, I deal with emotional problems very calmly	2%	6%	18%	75%
<b>Emotional exhaustion</b>					
1	I feel emotionally tired from my work	62%	32%	4%	1%
2	I feel exhausted at the end of the workday	8%	55%	23%	13%
3	I feel tired when I get up in the morning and have to face another day on the job	38%	49%	10%	4%
4	Working with children all day gives me stress	76%	21%	2%	0%
5	At the end of the day I am so tired that I want to cry	59%	32%	5%	3%
6	I feel frustrated by my job	89%	8%	2%	1%
7	I feel I am working too hard on my job	52%	35%	7%	6%
8	I feel that I can’t take it any longer to continue teaching	91%	8%	0%	1%

Note: For the scale of personal accomplishments, the scores range from 1 (Not at all true) to 4 (Exactly true). And for the scale of emotional exhaustion, the scores range from 1 (I never experience this) to 4 (I very always experience this).

We have estimated reliability statistics close to or greater than 0.7 for ‘personal accomplishments’ ( $r=0.662$ ) and ‘emotional exhaustion’ ( $r=0.808$ ).

#### 8.1.4 Self-Assessed Teacher Efficacy

According to Schwarzer and Hallum (2008), self-assessed teacher efficacy is an important predictor for job stress and burnout. The authors use a scale for the measurement of teacher self-efficacy, which has been constructed in Schwarzer, Schmitz and Daytner (1999). The scale consists of 10 questions in total. The estimated reliability statistic for teacher efficacy is equal to ( $r=0.685$ ). The answers on the questions underlying self-assessed teacher efficacy can be found in Table 8.

*Table 8: Scores on the sub-questions of the scale self-assessed teacher efficacy*

Q(n°)	Description	Scores (max.4)			
		1	2	3	4
1	I am convinced that I am able to teach successfully all relevant subject content to even the most difficult students	3%	13%	27%	57%
2	I know that I can maintain a positive relationship with parents, even when tensions arise	2%	5%	17%	77%
3	When I try really hard, I am able to reach even the most difficult students	1%	4%	15%	80%
4	I am convinced that as time goes by, I will continue to become more and more capable of addressing my students' needs	0%	2%	7%	91%
7	If I try hard enough, I know that I can exert a positive influence on both the personal and academic development of my students	1%	3%	8%	88%
8	In my work, I am convinced that I can develop creative ways to deal with system constraints and continue to teach well	2%	5%	18%	74%

Note: The scores range from 1 (Not at all true) to 4 (Exactly true).

#### 8.1.5 Motivation toward Work Tasks

The Work Tasks Motivation Scale for Teachers (WTMST) assesses five motivational constructs toward work tasks, namely: intrinsic motivation; identified regulation; introjected regulation; external regulation; and amotivation. Each motivational construct consists of 3 questions so that we have 15 questions in total measuring teachers’ overall motivation toward work tasks. The reliability statistics are moderate for intrinsic motivation ( $r=0.718$ ); for

introjected regulation ( $r=0.604$ ); and for external regulation ( $r=0.607$ ). The other reliability statistics are poor for identified regulation ( $r=0.493$ ); and for amotivation ( $r=0.558$ ). Only intrinsic motivation meets the critical bound. Table 9 presents the answers to the questions underlying the different motivation scales.

*Table 9: Scores on the sub-questions of the scales intrinsic motivation; identified regulation; introjected regulation; external regulation; and amotivation*

Q(n°)	Description	Scores (max.5)				
		1	2	3	4	5
<b>Intrinsic motivation</b>						
1	Because teaching is pleasant to carry out	2%	1%	5%	19%	74%
6	Because I find teaching interesting to do	3%	2%	4%	20%	72%
10	Because I like teaching	3%	1%	3%	16%	77%
<b>Identified regulation</b>						
2	Because teaching enables me to achieve my own work objectives	1%	3%	5%	25%	66%
12	Because teaching is important for me to do this task	1%	2%	3%	17%	77%
14	Because I find teaching important for the academic success of pupils	1%	0%	1%	10%	87%
<b>Introjected regulation</b>						
4	Because I would feel guilty if would not teach	14%	4%	8%	20%	54%
7	Because if I don't teach I will feel bad	23%	7%	12%	23%	35%
<b>External regulation</b>						
5	Because I'm paid to teach	34%	8%	12%	16%	29%
8	Because my work demands teaching	14%	4%	6%	21%	55%
15	Because the school obliges me to teach	56%	9%	6%	12%	17%
<b>Amotivation</b>						
3	I don't know, I don't always see the relevance of teaching	82%	5%	6%	4%	3%
11	I used to know why I was teaching, but I don't see the reason anymore	78%	5%	8%	5%	5%
13	I don't know, sometimes I don't see the purpose of teaching	89%	3%	4%	2%	2%

Note: The scores range from 1 (Completely disagree) to 5 (Completely agree). The value of 3 indicates neutral.

**8.2 Discussion of quality**

We have measured several non-cognitive outcome variables by using validated questionnaires from past published research in the field. Further, we have conducted several pilot initiatives in order to validate and test the questionnaire. Despite the good overall quality

of the selected questionnaires, the extensive piloting phase and the professional translation/presentation of the English questions into Kinyarwanda, we still observe poor reliability statistics for some outcome measures. This is most likely due to the population of study: whereas we conduct the questionnaire among Rwandan teachers, in most cases the questionnaires have only been validated in the past in Western societies, and, additionally, not necessarily among teachers. Only questionnaire with regard to experienced job stress and burnout of Maslach and Jackson (1981), have been explored in African countries (Rajan & Engelbrecht, 2018). Further, it may be the case that the Rwandan population answered some questions in a socially desired way. Cultural norms and values can influence the way we perceive a question, and, as such, how we provide answer to that question. Furnham (1986) argues that social desirability is a relatively stable, multidimensional trait of persons in very different situations, and, therefore, that answer patterns even could be used to study a populations' view on (ab)normality. We consider this beyond the scope of this study, but this drawback should be taken into account when analysing further results.

We argue to keep eight outcome measures for further evaluation that have had stable results in the pilot and baseline study, namely: Job satisfaction; Teacher efficacy; Personal accomplishments; Emotional exhaustion; and Intrinsic motivation; Need for autonomy; Need for relatedness; and Amotivation. Five scales (except for need for autonomy; need for relatedness; and amotivation) have reliability statistics close to, or above the critical value of 0.7. However, we still include the scales of need for autonomy; need for relatedness; and amotivation since they contribute to the overall picture that we wish to study.

## 9 Evaluation of the pre-treatment outcomes

Table 10 presents the mean and standard deviation of the outcome variables together with the mean difference between the two different treatment groups and the control group. T-tests are used for computation of significance levels. The mean is the average of each scale

(unstandardized coefficients). We only present T-test statistics for those outcomes that satisfy the quality criteria of being a valid and reliable scale (Section 8.2).

*Table 10: T-test of outcome variables*

	Control group		Treatment Group 1		Sig.	Treatment Group 2		Sig.
	Mean	Std.Dev	Mean	Std.Dev		Mean	Std.Dev	
Job satisfaction	4.2	0.7	4.2	0.7		4.1	0.7	
Teacher efficacy	3.7	0.4	3.7	0.4		3.6	0.4	*
Personal accomplishments	3.8	0.3	3.7	0.4		3.7	0.4	
Emotional exhaustion	1.6	0.5	1.5	0.4	*	1.5	0.4	
Intrinsic motivation	4.6	0.7	4.6	0.7		4.7	0.6	
Needs for autonomy	3.4	0.8	3.4	0.7		3.4	0.7	
Needs for relatedness	2.2	0.4	2.2	0.4		2.1	0.4	
Amotivation	1.4	0.7	1.5	0.8		1.4	0.7	

Note: The maximum score on each scale is 5. Significant levels are denoted at 1%-level (\*\*\*); 5%-level (\*\*); and 10%-level (\*).

All scales except for emotional exhaustion and needs for relatedness present medium to high scores. There is no significant difference between the treatment groups and the control group in this regard. However, the standard deviation for job satisfaction, need for autonomy and intrinsic motivation is quite high (0.7). This indicates that non-negligible variance in answers to these outcome variables is present. Smaller variance is found for teacher efficacy and personal accomplishments. The average scores (of 3.7) on these scales are moderately high for teacher efficacy and personal accomplishments, respectively. We do not observe a significant difference between the Treatment Group 1 and the control group on these two scales. There is a significant difference at 10%-level on teacher efficacy between Treatment Group 2 and the control group. Similarly, we observe a significant difference at 10%-level between Treatment Group 1 and the control group on emotional exhaustion. Overall, we can conclude that the RCT design succeeds well in making the treatment groups and control group comparable.

## 10 Conclusion

This paper presented a baseline study on the evaluation of a newly developed mentoring certificate programme in Rwanda. The objective of this baseline study is to assess the baseline status of primary outcome measures for the intervention and control group and test for any differences between the two groups. The primary outcome measures are job satisfaction, work related needs satisfaction, job stress and burnout, teacher efficacy and motivation. Furthermore, the baseline results on these outcome measures are described.

In order to conduct the baseline study, questionnaires have been administered among a sample of 719 teachers. Of these respondents, 412 teachers will eventually receive the newly established mentoring certificate programme. As such, the baseline study refers to the period before the execution of this programme.

This baseline study shows that overall treatment and control groups are very similar on pre-treatment characteristics and on the baseline outcome measures.

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