



## RADIO INSTRUCTION TO STRENGTHEN EDUCATION (RISE) IN ZANZIBAR



LEARNING GAINS ASSESSMENT:  
MORE THAN CHILD'S PLAY

November 2009

*Students at a RISE learning center, who now have access to an early childhood education.*



**USAID**  
FROM THE AMERICAN PEOPLE



**EDC**  
Education Development Center, Inc.

# ACKNOWLEDGEMENTS



**ON THE FRONT COVER:**  
*Students at a RISE learning center, who now have access to an early childhood education.*



**ON THE BACK COVER:**  
*Students that participate in the RISE project show that IRI is more than just child's play.*

This impact study was a collaboration between Zanzibar's Ministry of Education and Vocational Training and the *Radio Instruction to Strengthen Education* (RISE) project staff at Education Development Center, Inc.

The study design, collection of data, and writing of the report were largely carried out by Emily Morris, Miriam Philip, Abrahman Faki Othman, and James Mitchell of the RISE project. Esteban J. Quiñones and Denisse Leatxe, the consulting team, were responsible for analyzing and interpreting the data and the report design and layout. RISE's district coordinators, together with district representatives from Zanzibar's Ministry of Education and Vocational Training (MoEVT), conducted all the pre- and post-testing and collected control variable data under the coordination of Abrahman Faki Othman and Juma Hussein Omar. These representatives include the following:

<b>Micheweni PEMBA</b>	Shoka Hamad Abeid, Faki Hamad Faki, Said Mwinyi Shapandu, Hamad Shehe Bakar
<b>North A UNGUJA</b>	Mshamara Chum Kombo, Mohamed Khamis Suleiman, Bakar Jaha Muhidin, Ahmada Ali Khamis, Kundi Ngwali Haji

This study was made possible under the leadership of MoEVT, Zanzibar, and especially Ms. Mwanaidi Saleh Abdalla, Mr. Abdulla Mzee Abdulla, and Ms. Maryam Abdalla Yussuf. Support was provided by the American people through the United States Agency for International Development (USAID), under the direction of the USAID Mission in Tanzania. Acknowledgements also go to the following people for their assistance and contributions to this study: Bishara T. Mohamed, Asha Ahmed Mohammed, Hetal Thukral, Jennifer Ho, Steve Azalone, Suzanne Simard, Dan Pier, Mike Laffin, Angeli Kirk, and Thecla Ree.

And finally thank you to all the children, teachers, mentors, parents, and communities who participated in this study and who make the RISE project a success.

RADIO PHOTOS ON PAGES 7, 8 AND 23 Peter Benett | PHOTOS OF FORMAL CLASSROOM AT BOTTOM OF PAGE 19, NON-FORMAL CLASSROOMS ON PAGES 21 AND 24, AND GIRL WITH SPECIAL NEEDS ON PAGE 20 James Mitchell | OTHER PHOTOS RISE Project

*This impact study is made possible by the generous support of the American people through the United States Agency for International Development (USAID). The contents are the responsibility of the Education Development Center, Inc. (EDC) and do not necessarily reflect the views of USAID or the United States Government.*



*Implementation of activities are done in close collaboration with the Ministry of Education and Vocational Training (MoEVT), Zanzibar.*

**Educational Development Center, Inc.**  
Boston | New York | Washington, D.C. | [www.edc.org](http://www.edc.org)

# CONTENTS

---

<b>FOREWORD .....</b>	<b>4</b>
<b>ACRONYMS .....</b>	<b>5</b>
<b>TABLES AND FIGURES .....</b>	<b>6</b>
<b>MAP .....</b>	<b>6</b>
<b>EXECUTIVE SUMMARY .....</b>	<b>7</b>
<b>INTRODUCTION .....</b>	<b>10</b>
<b>STUDY DESIGN AND METHODOLOGY .....</b>	<b>13</b>
<b>FINDINGS .....</b>	<b>23</b>
<b>GENDER ANALYSIS .....</b>	<b>28</b>
<b>ISLAND ANALYSIS .....</b>	<b>30</b>
<b>POST-ANALYSIS: REASONS FOR THE DIFFERENCE IN PERFORMANCE ACROSS THE TREATMENT GROUPS .....</b>	<b>32</b>
<b>CONCLUSION .....</b>	<b>36</b>
<b>REFERENCES.....</b>	<b>37</b>
<b>ANNEXES .....</b>	<b>38</b>



# FOREWORD

---

While primary school education in Zanzibar is both compulsory and free for all children, the challenges of overage enrolment, retention and achievement in primary school exist. In an attempt to address these challenges, the Ministry of Education and Vocational Training (MoEVT) of Zanzibar in 2006 officially reduced the entry age of Standard One children to 6 years of age and made preschool education mandatory for all children.

The Radio Instruction to Strengthen Education (RISE) project at Education Development Center, Inc. (EDC), has helped MoEVT make strides in increasing preschool and Standard One enrolment through its 126 *Tucheze Tujifunze* learning centers, and it has helped improve the quality of learning in government schools in the districts of Micheweni, Pemba, and North A, Unguja. EDC and MoEVT have worked hand in hand to mobilize communities, establish learning centers, and facilitate trainings. In addition, the EDC-RISE staff is made up largely of MoEVT representatives who now have the capacity to plan, write, and produce Interactive Radio Instruction programs and to replicate the achievements of RISE in other districts. Finally, MoEVT officials from district education offices and teacher centers conducted all the pre- and post-tests for this impact study together, showing how important it is not only to implement activities, but also to assess them. Collaboration between EDC and MoEVT from start to finish has helped ensure that Interactive Radio Instruction achievements are sustainable and can be fully integrated into MoEVT's activities. Voice of Tanzania, Zanzibar, is a partner that also deserves recognition, as it has aired *Tucheze Tujifunze* programs weekly since August 2007 as part of its contribution to promoting educational achievement in Zanzibar.

This impact study is testimony to the power of learning core academics through the Zanzibar stories, culture, rhymes, and songs, and it demonstrates that learning can, and should, be fun. Findings from this study support MoEVT's policy of making 2 years of preschool education a mandatory component of the basic education system as preschool education provides a critical foundation for both academic and social development. The results in this study also show that Interactive Radio Instruction activities for early learners not only increase access to education, but more importantly improve student achievement.

Ms. Mwanaidi Saleh Abdalla  
Ministry of Education and Vocational Training  
Principal Secretary

# ACRONYMS

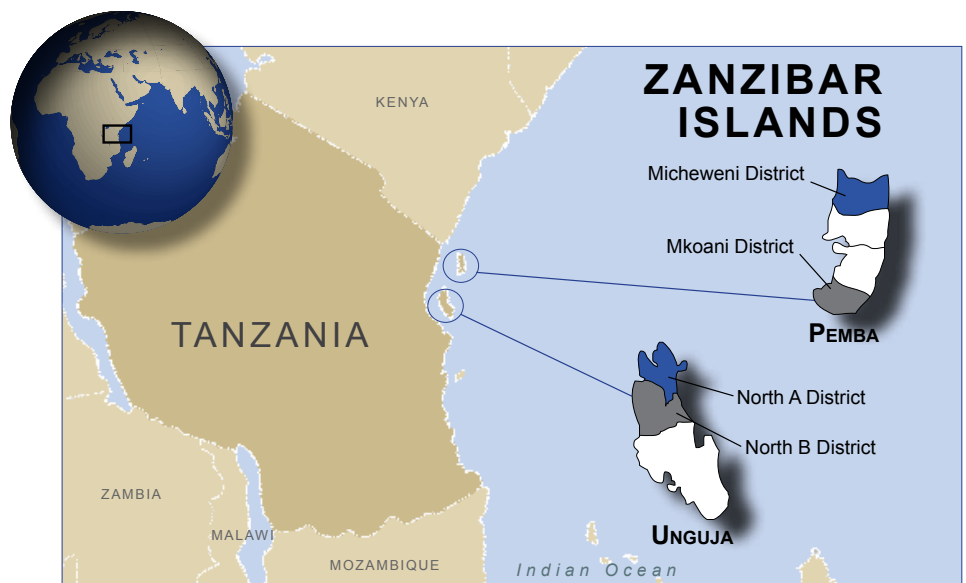
---

<b>EDC</b>	Education Development Center, Inc.
<b>GER</b>	Gross Enrolment Ratio
<b>IRI</b>	Interactive Radio Instruction
<b>MoEVT</b>	Ministry of Education and Vocational Training
<b>NER</b>	Net Enrolment Ratio
<b>RISE</b>	Radio Instruction to Strengthen Education
<b>TuTu</b>	<i>Tucheze Tujifunze</i> (Play to Learn)
<b>USAID</b>	United States Agency for International Development

# TABLES AND FIGURES

TABLE 1 – Sample Breakdown .....	16
TABLE 2 – Double Difference Approach .....	39
TABLE 3 – Mean Center and Student Variables for Treatment and Control Groups .....	40
TABLE 4 – Mean District Variables for Treatment and Control Groups	41
TABLE 5 – Overall Double Difference Results .....	42
TABLE 6 – Double Difference Results by Subject .....	43
TABLE 7 – Double Difference Results by Group .....	44
TABLE 8 – Double Difference Results by Gender .....	45
TABLE 9 – Double Difference Results by Island .....	46
FIGURE 1 – Double Difference Results for Treatment and Control Groups .....	23
FIGURE 2 – Double Difference Results by Group and Subject.....	24
FIGURE 3 – Double Difference Results by Gender .....	28
FIGURE 4 – Double Difference Results by Island .....	30

## MAP



# EXECUTIVE SUMMARY

## BACKGROUND AND OBJECTIVES OF THE STUDY

The *Radio Instruction to Strengthen Education* (RISE) project is a partnership between Zanzibar's Ministry of Education and Vocational Training and Education Development Center, Inc., with funding from the American people through the United States Agency for International Development (USAID). The RISE project was established in Zanzibar in 2006 to develop and pilot several models of early childhood education service delivery for children in the most underserved areas. Working collaboratively with Zanzibar's MoEVT, RISE has helped build on and expand Zanzibar's existing early childhood education infrastructure through its Interactive Radio Instruction (IRI) activities. In the 2 years since its inception, RISE has provided early childhood education opportunities to more than 10,000 Zanzibari children. By the end of 2010, RISE will have reached more than 20,000 children.

IRI is an interactive teaching and learning methodology that promotes quality learning in diverse environments, including those with shortages of qualified teachers, school infrastructure, and learning materials. RISE's unique *Tucheze Tujifunze* (TuTu) series consist of early childhood radio programs carefully developed for Zanzibari students by Zanzibari educators. RISE has produced Preschool, Standard One, and Standard Two series ranging from 78 to 99 programs. Based on child-friendly pedagogy that is inclusive, playful, active, and engaging for young students, each 30-minute broadcast integrates the formal Zanzibar curriculum with games, songs, stories, and activities that encourage problem solving and self-directed exploration. Each program covers four subject areas: Kiswahili language, math, English, and basic life skills.

To assess the impact of the project, RISE conducted a comprehensive evaluation between January and December 2008 with two purposes:

- Measure the learning gains of IRI beneficiaries
- Investigate the effectiveness of different IRI delivery models

## RESULTS

### LEARNING GAINS OF IRI BENEFICIARIES

Baseline and outcome tests were administered to treatment and control



*The radio is the key medium of instruction for reaching RISE's remote and underserved communities. This cost effective radio is solar and wind-up powered, and it is resistant to inclement weather.*



*Community mobilization is critical to ensuring local management and sustainability of RISE centers.*

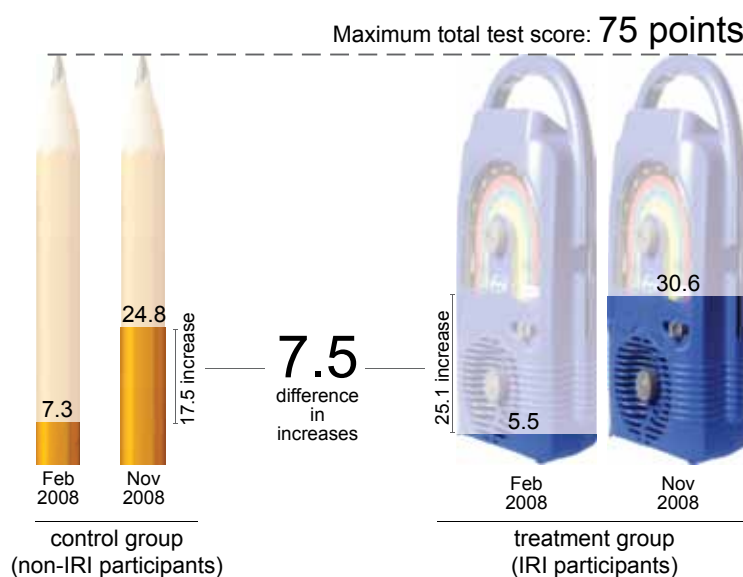


Teachers and mentors are trained in IRI and child friendly pedagogy.

group samples of Standard One-level students to assess learning gains as a result of RISE’s IRI activities. Treatment and control group students were comparable, except that treatment students also received the IRI programs. Any difference in test scores between the treatment (IRI students) and the control (non-IRI students) students can thus be attributed to the IRI program. Results show that RISE’s IRI beneficiaries outperformed control students by 7.5 points out of 75 total points (or 10%), overall.<sup>1</sup> The greatest subject gains were made in Kiswahili. Test scores rose by approximately 3 points, on average, as a result of RISE interventions, over and above scores for control students. Progress is also evident in English and math results, where scores have risen by about 2 and 2.5 points, respectively, for treatment students over and above gains made by control group students. When comparing results by gender, student learning gains among treatment girls are shown to be greater than gains made by boys, demonstrating that IRI programming is girl-friendly and inclusive.



RISE uses locally developed learning materials, which can be collected for little to no cost. These materials are also used to teach math, literacy and life skills.



## EFFECTIVENESS OF IRI DELIVERY MODELS

Three different models (Non-formal, Formal, and Combination) are used to deliver IRI Standard One programs to students in Zanzibar. In remote communities, RISE has established non-formal centers, and it has trained local community members as mentors to guide students through the TuTu broadcasts and post-broadcast activities (Non-formal model). TuTu lessons are also delivered to students in formal government school classrooms, and additional training in IRI pedagogy is provided to the

<sup>1</sup> These findings are confirmed by a positive program effect size of 0.55, which falls in the medium range. In other words, the mean of the treatment (IRI) group is at the 76<sup>th</sup> percentile of the control group.



classroom teachers (Formal model). The third model is a combination of providing non-formal TuTu programming and formal non-IRI schooling to students (Combination model).

For this assessment, data were collected from a representative sample of each of the three groups of students (Non-formal, Formal, and Combination). Results show the non-formal and formal groups have increased their test scores relative to the control group by approximately 9 (12%) and 11 (14.6%) points, respectively, as a result of RISE interventions. Results indicate that these two groups represent the most effective service delivery mechanisms for IRI early childhood education in underserved Zanzibari communities.<sup>2</sup>

## OTHER FACTORS INFLUENCING LEARNING GAINS

Results show that a variety of complementary factors play a role in positively affecting test score gains. Preschool education emerges as the most influential of these factors. Students who had previously attended preschool scored nearly 4 points higher, on average, than their counterparts who did not attend preschool. This result is evident, to varying degrees, across groups, disciplines, genders, and districts, regardless of whether this early childhood education took place in an IRI formal or non-formal preschool setting. This finding supports Zanzibar's Ministry of Education and Vocational Training's policy initiative of making preschool education a mandatory component of the basic education system, and it further reinforces the need for projects such as RISE that increase access to and quality of preschool provision in Zanzibar.

## CONCLUSION

Substantial test score gains across all three tested disciplines (Kiswahili, math, and English) show that the IRI programming and approach have increased learning gains in both formal and non-formal settings in Zanzibar relative to a control group. Although students in formal treatment classrooms made the most significant learning gains, non-formal treatment students were not far behind them. Whereas both boys and girls benefited from the RISE intervention, girl students showed greater overall growth. This evaluation demonstrates that RISE's unique combination of IRI programming and early childhood education not only engages learners, but also promotes the quality of their learning.

<sup>2</sup> This is also supported by effect size calculations, which show that RISE had the largest impact on the formal group (0.80 effect size) and a large to medium impact on the non-formal group (0.70). In other words, the mean of the formal group is at the 79<sup>th</sup> percentile and the mean of the non-formal group is at the 76<sup>th</sup> percentile of the control group.

Results show that RISE's IRI beneficiaries outperformed control students by 7.5 points out of 75 total points (or 10%), overall.



*A government official assessing a student's learning gains. Benchmark tests are essential for evaluating project impact.*



*“The Standard One enrolment in Micheweni District has surpassed the target goal, largely due to the RISE project.”*

Faki Sleyyum Faki  
District Education Officer  
Micheweni, Pemba

# INTRODUCTION

## EDUCATION IN ZANZIBAR

Zanzibar is an archipelago in the Indian Ocean made up of numerous islands, the two largest of which are Pemba (population 360,797) and Unguja (population 620,957) (United Republic of Tanzania, 2002). Although Zanzibar officially joined the United Republic of Tanzania in 1964, it has retained autonomy over its internal affairs, including the provision and financing of education. Zanzibar is 99% Muslim and economically reliant on agriculture (particularly fishing and the spice trade) and tourism.

Primary school is free and compulsory in Zanzibar, and the gross enrolment ratio (GER) is more than 100%. However, the net enrolment ratio (NER) is 77.3% for boys and 78.7% for girls, according to the Revolutionary Government of Zanzibar, Ministry of Education and Vocational Training (MoEVT), in its 2006 Education Policy (MoEVT, 2006, p. 11). The NER is low relative to the GER because of the large number of overage students<sup>3</sup>. In order to address this challenge of overage students, Zanzibar’s MoEVT, in its 2006 Education Policy, formally set the goal of reducing the entry age of primary school, Standard One<sup>4</sup> students to 6 years of age as well as increasing the enrolment of children in pre-primary education from 15.9% in 2005 to 35% in 2010 (MoEVT, 2007, p. 2).

Further goals that the 2006 Education Policy has set include raising the quality of education delivery, improving the education ability and number of trained teachers, and addressing an acute shortage of classrooms and serious overcrowding in a number of districts. Although gender parity has been achieved for the GER at the primary level, government policy recognizes the importance of ensuring the retention and progression of girls in education in the face of potential gender inequalities related to asymmetrical resource allocation and household responsibilities.

The RISE project was established largely to support MoEVT in its efforts to put its new education policy into practice.



*Zanzibar’s 2006 Education Policy recognizes an acute shortage of classrooms and overcrowding in a number of districts, such as this RISE Standard One government school classroom.*

<sup>3</sup> GER measures the total number of children enrolled, regardless of age, as a percentage of the population of children of that school age. The NER measures children of the appropriate age group enrolled in school as a percentage of the population of children of that school age.

<sup>4</sup> Standard One is equivalent to Grade One.

## THE RADIO INSTRUCTION TO STRENGTHEN EDUCATION (RISE) PROJECT

The *Radio Instruction to Strengthen Education* (RISE) project was established in Zanzibar in 2006 to develop and pilot several models of early childhood education service delivery for children in the most remote and underserved areas. The project is a partnership between Zanzibar's MoEVT and the international non-governmental organization Education Development Center, Inc. (EDC), with financial support from the American people through the United States Agency for International Development (USAID).

Part of MoEVT's 2006 strategy for rapidly increasing primary enrolment, and reducing the start age, includes using diversified delivery and information communication and technology systems, such as radio instruction, to increase access to educational opportunities (MoEVT, 2006, p. 11). The RISE project utilizes the Interactive Radio Instruction (IRI) methodology to provide children with foundational skills to promote their successful transition to and progression in primary school. IRI is an interactive teaching and learning methodology that enables quality learning to take place in diverse environments, including those with shortages of qualified teachers, school infrastructure, and learning materials. RISE's unique IRI series, *Tucheze Tujifunze* (TuTu), consist of early childhood radio programs carefully developed for Zanzibari students by Zanzibari educators. RISE has produced Preschool, Standard One, and Standard Two series ranging from 78 to 99 programs. Based on child-friendly pedagogy that is inclusive, playful, active, and engaging for young students, each 30-minute broadcast integrates the formal<sup>5</sup> Zanzibar curriculum with games, songs, stories, and activities that encourage problem solving and self-directed exploration. TuTu programs cover the four subject areas of Kiswahili, math, English, and life skills, which is a mix of environmental and health studies. The radio series also encourages community and parent listeners to accept a more active role in their children's education.

In addition to producing the radio series, RISE also builds the capacity of community leaders and teachers in mobilizing communities to support early childhood education, management of learning centers, and development of local materials. RISE helped to address the shortage of qualified early childhood teachers by training parents, caregivers, and other community members as teaching mentors, who are then responsible for facilitating RISE activities in their village or locale. Learners gather three times a week in non-formal IRI learning centers, where they tune into TuTu programs under the guidance of the mentor. IRI centers meet in

<sup>5</sup> The term "formal" is used in this report to describe the established government system.



*Zanzibar President Amani Abeid Karume (center), Minister of Education and Vocational Training Haroun Ali Suleiman (left) and US Ambassador to Tanzania Michael L. Retzer (right) launched the RISE Project in 2006 to develop and pilot several models of early childhood education service delivery for children in the most remote and underserved areas.*



*RISE's IRI programs are inclusive, playful, active, and engaging for young students.*



*RISE helped to address the shortage of qualified early childhood teachers by training parents, caregivers, and other community members as teaching mentors, who are then responsible for facilitating RISE activities in their village or locale.*

A key objective of the RISE project is to improve the quality of instruction and learning taking place in the classroom.

community-organized sites, which range from underneath a mango tree to a religious school classroom to a small thatched shelter (*banda*), depending on the community's resources. These centers are free of charge and are established close to the children's homes to increase accessibility for girls, children with special needs, and vulnerable children, such as orphans, who may not be attending school otherwise.

To date RISE has trained 309 mentors and assistant mentors and 30 village leaders to facilitate the live IRI lessons through a 3-day initial training and two 2-day follow-up trainings. By the end of 2010 this number will have increased to 429 mentors. RISE mentors are trained to guide young learners through the TuTu programs and to lead pre- and post-program activities that both reinforce the material covered in the radio program and increase children's depth of understanding. Mentors are provided with a guidebook that corresponds with the TuTu series and contains activities related to each program to help maximize student learning.

In addition to its non-formal IRI centers, RISE has piloted IRI activities in 60 formal Standard One and 60 formal Standard Two classrooms in 23 government schools across Unguja and Pemba to improve student performance, retention, and quality of learning. The project provided 120 government school teachers with an initial 2-day training in IRI pedagogy and project management, and two 2-day follow-up trainings. In January 2010, RISE will expand to another 60 Standard One and 60 Standard Two classrooms and train 120 new classroom teachers.

As of December 2008, RISE had provided early childhood education opportunities to more than 10,000 Zanzibari children. By the end of the project in 2010, it will have reached more than 20,000 children. Through its non-formal IRI centers as well as activities in government primary school classrooms, RISE has helped reduce overage enrolments, increase early childhood enrolment in its target districts, and helped MoEVT, Zanzibar make progress in reaching its new policy targets. In a speech to the Minister of MoEVT, the District Education Officer of Micheweni, Pemba, credited RISE in helping Micheweni not only reach the 2008 target enrolments, but surpass them by 15% as the majority of children who completed IRI center classes went on to enroll in formal school.

Although positive steps have been made toward increasing access in primary enrolment in Zanzibar, access alone does not catalyze school success. A key objective of the RISE project is to improve the quality of instruction and learning taking place in the classroom. This study will assess how the RISE project's activities have impacted student gains in three different Standard One non-formal and formal classroom models.



# STUDY DESIGN AND METHODOLOGY

---

## PURPOSE OF THE STUDY

This study is designed primarily to measure learning gains among Standard One-level treatment beneficiaries. It will test the hypothesis that a treatment sample of IRI student beneficiaries will perform better on benchmark tests *as a result of the RISE intervention* than a group of control students. The control students have similar characteristics to those attending formal schools at a Standard One level but have not been exposed to RISE's IRI programs.

A second objective of the study is to analyze the difference in treatment group students' performance according to the setting in which they received the intervention. In 2008, three different models were used to deliver Standard One TuTu programs to students in Zanzibar. These models include the following:

- |                        |   |
|------------------------|---|
| <b>Non-formal (A)</b>  | Students who live in remote communities have poor access to formal schools and attend centers led by a trained mentor. Non-formal centers use IRI lessons and activities as the central learning pedagogy.  |
| <b>Formal (B)</b>      | These are government primary school classrooms led by a certified teacher who has received additional training in IRI lessons and pedagogy. Classroom teachers use IRI lessons and activities to complement and supplement their instruction.   |
| <b>Combination (C)</b> | Students in this group received a combination of non-formal IRI lessons and formal education. These students attended IRI pre-school centers in 2007 prior to their enrolment in formal Standard One schools in 2008. Although they did not receive IRI lessons in the formal Standard One classes in 2008, they continued to receive Standard One TuTu lessons in non-formal IRI centers after their formal school day. Hence they received Preschool and Standard One IRI programming in addition to participating in non-IRI formal Standard One classrooms. |

This evaluation aims to measure the effectiveness of the three different delivery models and recommend which models should be used for future IRI and RISE interventions in Zanzibar. The performance of students from each of the above three delivery models will be compared to the



*The purpose of this study is to look at learning gains of IRI students relative to a control group.*



*A non-formal center listening to an IRI lesson. Communities provide the space for the center.*



*A formal government primary school classroom listening to an IRI lesson. Their teacher received additional training in IRI lessons and pedagogy from RISE.*

performance of students from the control group. It is hypothesized that change in performance among students in treatment groups B and C will be higher than the change in performance among students in the control group, due to the additional inputs provided by RISE, while change in performance among the control group students will be slightly higher than that of students in the non-formal treatment group A, as formal schools have certified educators, additional resources, and other inputs that non-formal centers (classrooms) do not have access to.

Finally, the study is also designed to highlight any other factors that may emerge that impact student learning gains.

This analysis is intended for immediate use by a number of stakeholders. Most importantly it is designed to inform the work of EDC-RISE project staff so they can adapt and modify their work according to informed evaluation and research. It will also be of use to MoEVT, Zanzibar education officials who are working to determine the effectiveness of different early childhood delivery models (both formal and non-formal) to meet policy goals and milestones, and to USAID to inform this organization of the impact of its funding in education in Tanzania. Finally, it can be used by a broader spectrum of policymakers, project managers, donors, and researchers interested in topics such as early childhood education in Sub-Saharan Africa, IRI, and innovative ways to improve issues of access and performance among marginalized and underserved communities in Tanzania.

## THE DATA

The panel data used in this analysis were collected by RISE as part of its monitoring and evaluation activities. The panel data consist of student scores from baseline and outcome tests (or pre- and post-tests), as well as a range of variables at the district, classroom/center, teacher/mentor, and student levels that control for observable differences in the treatment and control groups. Pretests were administered at the beginning of the 2008 school year from late February through mid-March, after attendance numbers had stabilized, and the final post-tests were administered in mid-November, prior to school closure<sup>6</sup>. Qualitative data were collected during subsequent year-round site visits.

Pre- and post-tests were developed by the RISE team in collaboration with Zanzibar's MoEVT and measured the mastery of major learning ob-



*Students in the combination group received a combination of non-formal IRI lessons and formal education.*

<sup>6</sup> Mid-tests were also conducted in late August, but results have not been incorporated in this impact evaluation study.

jectives in math, English, and Kiswahili. Life skills, a mix of environmental and health studies, is highly subjective and thus was excluded from the testing. Although tests are not the only means of measuring learning gains, they were the best quantitative measurement given the assessment objectives and resources. In order to make the tests as comprehensive and objective as possible, the tests comprised both an oral and written section (see Annex A for a sample of these tests). The test invigilators (which consisted of RISE staff and district MoEVT officials) were given a 3-day training on how to administer tests and control for bias. They also practiced administering these tests at an IRI center and a government school not involved in the study.

A semi-random two-stage sampling approach was used to determine the study's sample size. In the **first stage of sampling**, two beneficiary districts<sup>7</sup>, North A in Unguja and Micheweni in Pemba, were selected by central MoEVT officials based on their low level of education performance and development indicators relative to other districts in Zanzibar. To reduce a spill-over effect, or the unintended exposure of children and teacher to IRI programs and activities, control groups were selected from districts North B in Unguja and Mkoani in Pemba outside the beneficiary districts. These control districts had no direct exposure<sup>8</sup> to TuTu programming, but they have education, health, and economic characteristics similar<sup>9</sup> to North A and Micheweni, where the treatment was taking place. See Annex E for a more detailed description of the indicators according to the treatment and control districts compared to Zanzibar as a whole.

In the **second stage of sampling**, students from random IRI Standard One non-formal and formal classrooms, as well as control classrooms, were tested. RISE staff established a desired sample frame of approximately 20% of the intervention population (approximately 6,000 Standard One beneficiaries at the time of the selection) in order to collect sufficient data to achieve better than a  $\pm 3\%$  margin of error for the study divided equally between the two target districts. As learning gains were measured by the sum of individual students' change in test scores (pre- and post-), students who did not have both test scores were excluded from the data. Despite attrition from the original target size, a 14.4% sample size still allows for a relatively low margin of error ( $\pm 2.9\%$  to be precise),<sup>10</sup> and the

<sup>7</sup> There are ten administrative districts in Zanzibar.

<sup>8</sup> The TuTu radio programs are broadcast across Zanzibar over national radio. Therefore, ensuring that students were never exposed to the programs was impossible. However, by selecting districts outside the target area, the evaluation team attempted to minimize potential spill-over effects/biases.

<sup>9</sup> Although the differences between the district variables are small, it must be noted that differences are still statistically significant.

<sup>10</sup> This margin of error is a reasonably low value for an impact study and provides data users with a high level of confidence.



*Pre- and post-tests covered oral and written Kiswahili, English and math.*



*Pre- and post-tests were developed by the RISE team in collaboration with Zanzibar's MoEVT.*



*The test invigilators were given a 3-day training on how to administer tests and control for bias.*

final scores remained reasonably well stratified for control and treatment groups across time.

In total, the data consist of 1,543 individual student observations<sup>11</sup> from Zanzibar’s Unguja and Pemba islands. For Unguja, the data consist of 779 individual student observations: 485 treatment observations from North A district and 294 control observations from North B district. For Pemba, the data consist of 764 individual student observations: 503 treatment observations from Micheweni district and 261 control observations from Mkoani district. That makes a total of 988 treatment observations from 70 IRI centers and 555 control observations from 15 schools as shown in Table 1 below.

**TABLE 1 – SAMPLE BREAKDOWN**

Island	CONTROL			TREATMENT			TOTAL
	Unguja North	Pemba		Unguja North	Pemba		
<b>District</b>	B	Mkoani	<b>Total</b>	A	Micheweni	<b>Total</b>	
<b>Centers/ classes</b>	8	7	<b>15</b>	34	36	<b>70</b>	<b>85</b>
<b>Students</b>	294	261	<b>555</b>	485	503	<b>988</b>	<b>1,543</b>



*To reduce a spill-over effect, or the unintended exposure of children and teacher to IRI programs and activities, control groups were selected from districts North B in Unguja and Mkoani in Pemba outside the beneficiary districts.*

Of the 988 treatment observations, 269 were from the non-formal model (group A), 515 were from the formal model (group B), and 193 were from the combination model (group C).

## DATA LIMITATIONS

This study would have been more robust if RISE had conducted surveys at the household level in the treatment and control districts to acquire data on household income and assets, educational attainment, access to health and social services, etc. Given the limited resources and time constraints of what was initially a 2-year project time frame, this was not feasible. Nonetheless, RISE was able to gather a range of relevant and accurate data at the district, classroom/center, and student levels to control for observable factors that may have influenced student performance, such as class size, teacher/mentor educational attainment, student attendance, etc. With 14 observable control variables and a statistically significant sample

<sup>11</sup> A student observation refers to the pre- and post-test scores for each individual student.



size, RISE was able to conduct a quasi-experimental study that measures student learning gains as a result of IRI programming.

## CONTROL VARIABLES

A number of control variables at the district, classroom/center, and student levels were used to control for observable differences in the treatment and control groups. A description of these variables are below.

### DISTRICT VARIABLES

A list of standard variables were used to measure the welfare of the districts, including demographics (district population, size of household, number of female-headed households), education (educational attainment and adult literacy rates), distance to school and health facilities, condition of dwelling (electricity, toilet, roof), assets (radio, TV), and household income and expenditures. District variable data was obtained from the *Household Budget Survey 2004–2005*.

### CENTER/CLASSROOM VARIABLES

The following variables were used to assess differences in accessibility and quality of education provision:

<b>Class size ratio</b>	Class size indicates the level of educator-pupil interaction; the smaller the class size, the more time a teacher or mentor has to interact and assist individual pupils. Larger class sizes tend to have increased incidences of noise, behavior disruptions, shortages of resources, space constraints, and other factors that negatively impact individual student performance and learning. Target class sizes vary for the different groups in this study. In the formal school system the government stipulates a target class size of 45 students, although class sizes in the most underserved districts, such as those selected for the RISE intervention, often exceed this target. In the non-formal IRI settings (non-formal and combination groups) the target class size is 25 students. As it is acknowledged that there is a significant difference in class size between formal and non-formal settings, this variable measures the size of a class relative to its target. Class size ratios are calculated by dividing the total number of students enrolled by the target number of students for each setting (either 25 or 45 depending on the group).
-------------------------	---



*A number of control variables at the district, classroom/center, and student levels were used to control for observable differences in the treatment and control groups.*



*Class size indicates the level of educator-pupil interaction; the smaller the class size, the more time a teacher or mentor has to interact and assist individual pupils.*



*A semi-permanent structure has a roof (thatched or tin) but is only partially enclosed by walls, or it is a space where the class is housed but can be moved at any time.*

**Structure of the classroom**

Structure is important, as it allows consistency for children and teachers. Classes that take place in a permanent structure are less vulnerable to interruptions of weather, noise, scheduling conflicts, etc. In addition, permanent structures offer better wall space for teachers or mentors to display classroom materials. Classroom structures are sorted into three categories for this study: permanent, semi-permanent, and non-permanent. A permanent structure has a roof and four walls and provides a space where the class is scheduled to meet every day without interruption (a room in a formal school, a vocational center, etc.). A semi-permanent structure has a roof (thatched or tin) but is only partially enclosed by walls, or it is a space where the class is housed but can be moved at any time depending on the owner’s needs (such as a house, a storefront, etc.). A non-permanent structure includes outside spaces without a roof or walls, such as underneath a tree.

**Center/school attendance**

Classroom attendance is often correlated to student performance. The more a student attends class, the more likely he or she is to master classroom syllabus and content, succeed on tests and assignments, and progress to subsequent levels. This variable was measured as an annual classroom attendance rate, or an average of the classroom/center’s monthly attendance rate. The monthly attendance rate is calculated as: sum of actual daily student attendance/sum of enrolled students times number of contact days.

**Radio programs heard**

This variable measures how many of the total 99 broadcast programs the classrooms actually heard. The more programs the classroom heard, the more completely the IRI intervention was received.

**Head teacher/sheha certification in management**

This variable measures whether or not the person responsible for overseeing the management of the formal school (head teacher) or non-formal center (*sheha*) has received official management certification. The *sheha* is a local government leader responsible for overseeing all matters of administration within his or her ward, which includes the IRI non-formal centers. It is assumed that classroom/center leaders with certification are more effective at managing and overseeing school and center activities and will be able to more effectively support educators.

**Head teacher/sheha educational attainment**

This variable measures whether or not the head teacher/*sheha* has completed Form Four (the ordinary or first level of secondary education). It is assumed that head teachers who have successfully completed their ordinary secondary levels will have higher literacy and other skills required to oversee and manage school and center activities and will be able to more effectively support educators.



*One of the control variables in this study was the number of radio programs heard. The more programs the classroom heard, the more completely the IRI intervention was received.*

<b>Educator educational attainment</b>	This variable measures whether or not the educator has completed Form Four (the ordinary or first level of secondary education). Completion of Form Four (at a minimum) is required in order to progress to a teacher college or other tertiary institution. It is assumed that educators who have successfully completed their studies will have mastered subject content and will be more proficient in teaching.
<b>Educator certification</b>	This variable measures whether or not the educator has received official certification from a teacher training institution. It is assumed that certified teachers are more qualified to teach and therefore have better skills and pedagogy than non-certified teachers. It must be noted that no IRI non-formal center educators are formally certified, as the project is designed to reach communities far from formal schools and/or those with a shortage of trained/certified teachers. <sup>12</sup>
<b>Educator gender</b>	This variable controls for whether or not gender influences a teacher's ability to teach. For example it is often hypothesized that female educators in Sub-Saharan Africa are more effective teachers, as the role of caring for young children is primarily a female obligation and women are seen as more nurturing. In Sub-Saharan Africa, 2007 statistics show that 68% of pre-primary teachers were women and 44% of primary teachers were women (UNESCO Institute for Statistics).
<b>Educator age</b>	This variable measures educator age in years. As the majority of teachers in Zanzibar do not receive regular in-service training and professional development, age may be a factor in the type of pre-service teaching pedagogy and training they received as well as in their comfort level in adapting to new curriculum and methodology. For example, older teachers may have more teaching experience but may be less comfortable learning and using new methodologies like IRI in their classrooms.



*The educator gender variable controls for whether or not gender influences a teacher's ability to teach.*

## STUDENT VARIABLES

The following indicators measure demographic or other differences among students:

<b>Gender</b>	Although gender parity has been achieved in terms of enrolment at the primary level in Zanzibar, potential inequalities related to asymmetrical resource allocation and household responsibilities may still negatively impact female educational achievement.
---------------	--



*Although gender parity has been achieved in terms of enrolment at the primary level in Zanzibar, potential inequalities related to asymmetrical resource allocation and household responsibilities were analyzed.*

<sup>12</sup> Also, although a teaching certificate is required to teach in formal schools, three of the formal educators in this study were not certified due to educator shortages in the various locales.



*Students who have had some access to preschool education will have gained a more solid foundation for learning and a head start in developing literacy and numeracy, and are therefore more likely to succeed in early primary school.*

**Age** | This variable is the age of the student in years. Older students are assumed to be more developed, behaviorally and cognitively, and therefore more able to learn new concepts and move quickly through the curriculum at the early primary level. The RISE project’s target age for Standard One students is between 6 and 8 years; however, the actual ages of students enrolled in the RISE project range from 4 to 13 years due to issues of overage enrolment.

**Preschool education** | This variable measures whether or not students had attended preschool prior to joining Standard One. It is expected that participation in preschool education enhances young children’s motor, cognitive, and social development. Students who have had some access to preschool education will have gained a more solid foundation for learning and a head start in developing literacy and numeracy, and are therefore more likely to succeed in early primary school (UNESCO, 2006, p. 11).

**Special needs** | This variable measures whether a student has a physical or mental learning disability. It is assumed that students with special needs face greater barriers to school access and need more one-on-one teacher attention and resources in order to succeed. Given a lack of teacher and mentor awareness on disabilities, mental and physical disabilities were likely underreported and therefore not disaggregated for this study.

## STUDY METHODOLOGY

This study attempts to evaluate learning gains among Standard One IRI beneficiaries in both non-formal and formal classroom settings compared to non-beneficiaries in a control group. This is done by analyzing mean change between panel data of pre- and post-tests across subjects, islands, genders, and target groups over time. Students measured in the control and treatment groups were randomly, or semi-randomly, selected as described in the section on data.

In order to evaluate test results over time, the double difference approach was employed. The double difference equation is  $(T_1 - T_0) - (C_1 - C_0)$ , or the difference in the control group (C) over time subtracted from the difference in the treatment group over time (T). The double difference method accounts for both changes over time and pretreatment differences (Maluccio, 2005; Ravallion, 2001). The use of control variables when calculating the double difference also improves efficiency and controls for some of the observable biases that may have influenced project impact (Skoufias, 2005, p. xi). For a more detailed description of the equations used in this study see Annex B.



*RISE centers are interactive and inclusive of all children, including this preschool girl with special needs.*



In addition to the double difference approach, this study utilizes effect size calculations to quantify the differences between the treatment and control groups' scores regardless of differences in sample sizes and other factors. Effect size shows the magnitude of test score means of the treatment group compared to the control group, and whether the difference in means scores was relatively small or large. Effect size is described in more detail in Annex B (Cohen, 1988; Glass, 1976; Ho & Thukral, 2009).

## CONTROL AND TREATMENT DESCRIPTIVE STATISTICS<sup>13</sup>

Before determining which group had the highest gains on tests, a statistical comparison<sup>14</sup> of the control and treatment groups by center- and district-level control variables was conducted. (See Table 3 and Table 4 in Annexes C and D for these comparisons.) Although the mean differences in control variables when comparing the control and treatment groups are relatively small in most cases, almost all prove to be statistically significant above a 99% level.<sup>15</sup> Some of these differences can be attributed to known and identified differences characteristic of the group. For example, all control schools are housed in permanent structures, whereas treatment group structures depend on whether the classroom is in a formal school or non-formal center. Educator characteristics are also statistically significant at a 99% level. On average control group teachers are nearly 8 years older than treatment group teachers; also, control group teachers are certified, whereas treatment group teachers are a mix of certified formal school teachers and uncertified non-formal teachers. It is interesting to note that the target class size ratios are similar between treatment and control groups, although their difference is statistically significant.

In terms of student variables, there are nearly 10% more boys than girls in the treatment group when compared to the control group. As enrolment of the total RISE beneficiaries is 50% girls, this discrepancy could be attributed to a larger number of boys being present for both pre- and post-tests. Five percent more control students received preschool education than treatment students, a statistically significant difference. When it comes to



*Child actor records the part of Aisha in the Standard One IRI series.*



*Each 30-minute broadcast integrates the formal Zanzibar curriculum with games, songs, stories, and activities that encourage problem solving and self-directed exploration.*

<sup>13</sup> It should be noted that for all three treatment groups, T-Test results generally follow those of the overall treatment group, and mean differences between groups are not large in magnitude in most cases but are consistently statistically significant.

<sup>14</sup> T-Tests were used to evaluate significance. For a more detailed description of the T-Test analysis conducted, see *Research Methods Knowledge Base*.

<sup>15</sup> Statistical significance is a term used to indicate whether the result could have occurred by chance. In other words, an outcome that is statistically significant at the 99% level indicates that there is only a 1 in 100 chance that the result occurs due to a coincidence. Practically, this means that the higher the level of statistical significance, the stronger the evidence of the result.



*RISE uses locally developed learning materials, which can be collected for little to no cost. These materials are also used to teach math, literacy and life skills.*

test scores, the differences between treatment and control groups range from less than 1 to almost 6 points.<sup>16</sup>

The control group scored higher on the pre-test by nearly 2 points (2.6%) but was outperformed by the treatment group by almost 6 points (8%) in the post-test. The findings that the control group's mean pre-test score is higher than the treatment group's mean pre-test score at a statistically significant level of 99% suggest that the students in the control group are initially higher achievers than those in the treatment group. On the other hand, the observation that the treatment group's mean post-test score is higher than the control group's mean post-test score indicates that despite the treatment group's lower starting point, it is better off in the end as a result of RISE's intervention. Therefore, it should be highlighted that students in the treatment group appear to overcome an initial disadvantage of approximately 2 points to surpass students in the control group by 6 points, or 8% (roughly an 8-point improvement).

Although RISE did not collect household data, it is still possible to make some comparison of the control and treatment groups at the district level as shown in Table 4 in Annex D (Revolutionary Government of Zanzibar, 2006). Although the differences between the control and treatment districts in the areas of demographics, proximity to schools, and assets are relatively small, the control district is slightly better off in all of these areas at a 99% significance level. In the area of adult education, attainment and literacy are 16% and 14% higher, respectively, for the control group. Finally, poverty, assessed according to basic needs or food thresholds, is 13% to 19% higher in the treatment group.



*Bottle caps, seashells, sticks, seeds and other local materials are used as literacy and math manipulatives.*

<sup>16</sup> The magnitude is slightly smaller for individual test components, ranging from nearly 0 to almost 4 points, though the differences are consistently significantly different, with the exception of the English post-test.

# FINDINGS

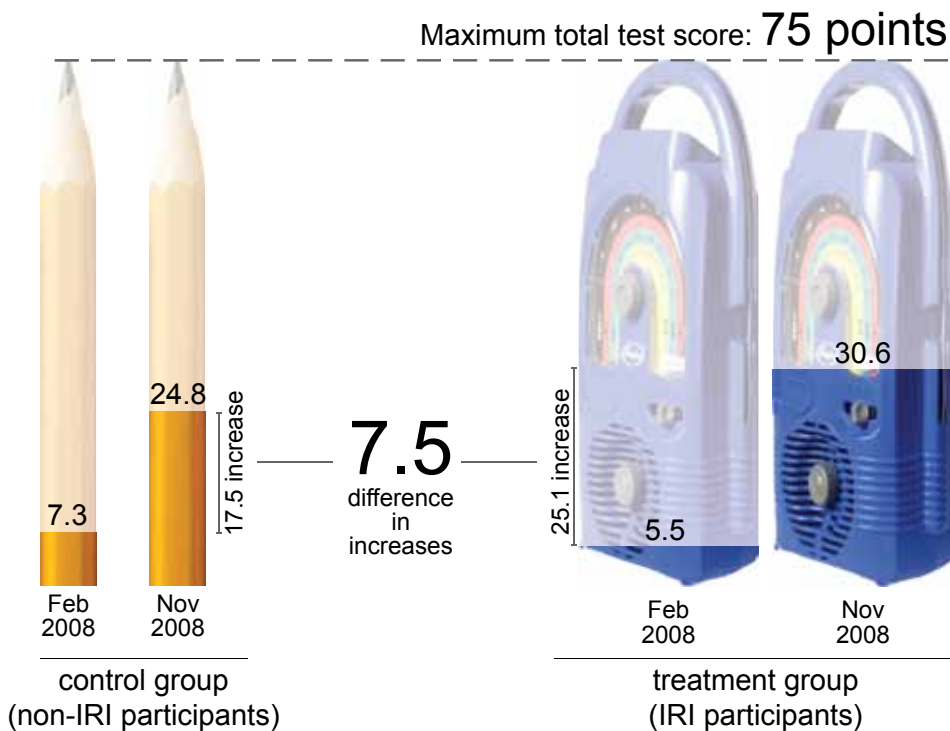
Pre- and post-tests were administered to treatment and control samples of Standard One-level students to 1) assess learning gains as a result of RISE’s IRI activities, 2) to analyze effectiveness in different IRI delivery models, and 3) to analyze other factors, such as gender or locale, that may have influenced learning gains. Findings are presented below.

## LEARNING GAINS OF RISE BENEFICIARIES

This analysis compares the mean change in test scores (including total and individual subject tests) for the entire treatment group compared to the control group.<sup>17</sup>

Overall, IRI beneficiaries scored 7.5 points (or 10%) higher on tests than control group students.

**FIGURE 1 – DOUBLE DIFFERENCE RESULTS FOR TREATMENT AND CONTROL GROUPS**



*The study analysis compares the mean change in test scores (including total and individual subject tests) for the entire treatment group compared to the control group.*

<sup>17</sup> See Table 5 (Annex E) for the data analysis for control vs. treatment for overall scores, and Table 6 (Annex F) for control vs. treatment by individual test scores.



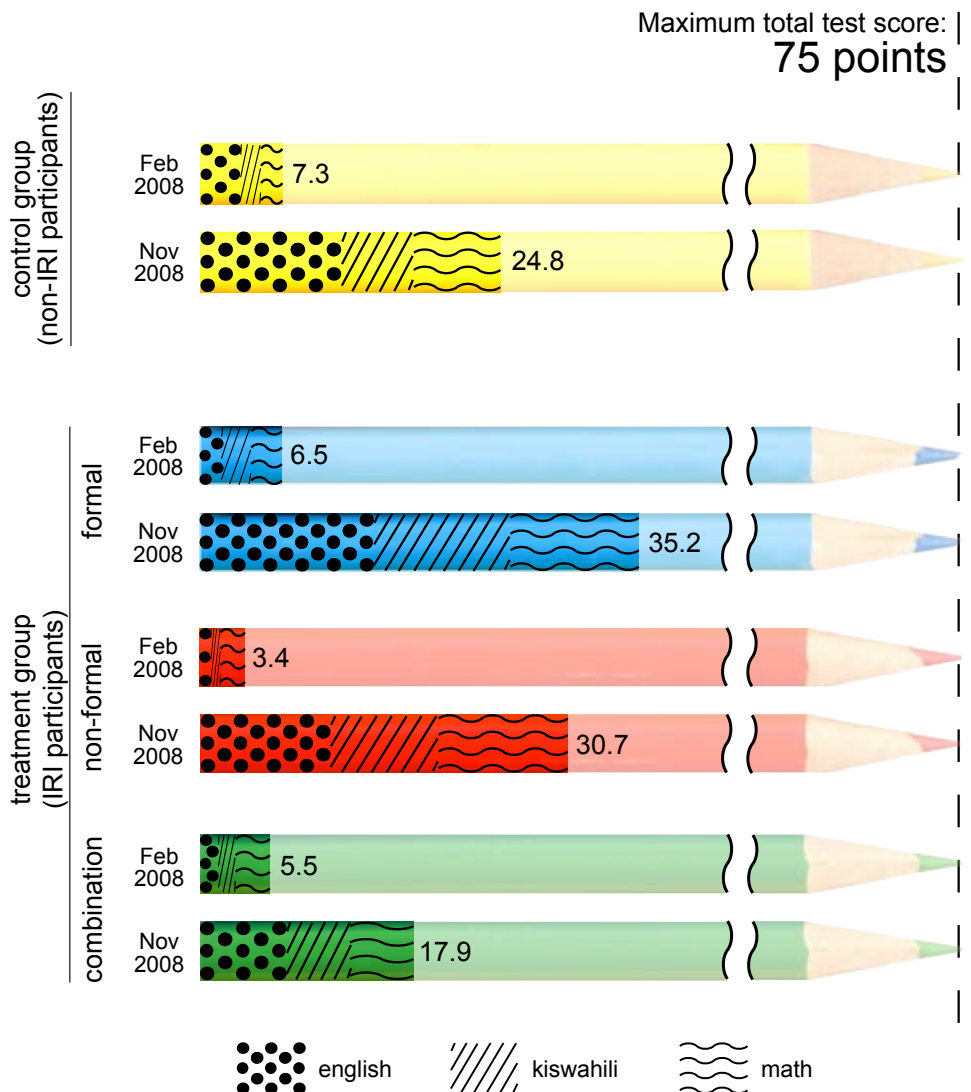
Before the IRI programs are aired they undergo a formative evaluation, which measures content, comprehension and appropriateness.



Non-formal students, even with their fewer contact hours, uncertified teachers, and less formal learning environment, performed better than control students.

Analysis of pre- and post-tests, with the use of control variables, shows that IRI beneficiaries scored 7.5 points higher out of 75 total points (or 10%) than control students overall at a 99% significance level. Although IRI students scored on average 2 points (2.6%) below the control students on pre-tests, they closed this gap and showed higher overall gains after post-testing. Given that district-level indicators were higher for the control group, and the treatment group consists of both non-formal and formal students, this gain is impressive and demonstrates that IRI students overall made higher learning gains as a result of the intervention.<sup>18</sup>

FIGURE 2 – DOUBLE DIFFERENCE RESULTS BY GROUP AND SUBJECT



<sup>18</sup> In terms of effect size (RISE = 0.55), RISE students perform, on average, at the 76<sup>th</sup> percentile of the control group. Using Cohen's categorization discussed in Table 2 (Annex B), an effect size of 0.55 represents a medium, positive impact of the RISE programs.



Figure 2 divides total test scores into the three tested curriculum subjects (each subject was scored out of a total of 25 points). The greatest subject gains were made in Kiswahili, where as a result of RISE interventions, test scores rose by approximately 3 points (12%) over and above gains made by control group students (at a 99% significance level). Progress is also evident in English and math results, where scores have risen by about 2 (8%) and 2.5 points (10%), respectively, over and above gains made by control group students.

## EFFECTIVENESS OF DELIVERY MODELS<sup>19</sup>

Three different models (non-formal, formal, and combination) are used to deliver IRI Standard One programs to students in Zanzibar. In remote communities, RISE has established non-formal centers, and it has trained local community members as mentors to guide students through the TuTu broadcasts and post-broadcast activities (non-formal model). TuTu lessons are also delivered to students in formal government school classrooms, and additional training in IRI pedagogy is provided to the classroom teachers (formal model). The third model is a combination of providing non-formal TuTu programming and formal non-IRI schooling to students (combination model).

For this assessment, data were collected from a representative sample of each of the three groups of students (non-formal, formal, and combination). Results show the non-formal and formal groups have increased their test scores relative to the control group by approximately 9 (12%) and 11 (14.6%) points, respectively, as a result of RISE interventions.<sup>20</sup> Surprisingly, the combination group did worse than the control group by more than approximately 5 points over time. Reasons for the poor performance of the combination group will be discussed in the Post-Analysis section. Results indicate that the formal and non-formal groups represent the most effective service delivery mechanisms for IRI early childhood education in underserved Zanzibari communities<sup>21</sup>.

It is not surprising that the treatment formal group had higher learning gains than the control group, as they have similar learning environments

<sup>19</sup> See Table 7 (Annex G) for the data analysis.

<sup>20</sup> This is at a 99% statistical significance level, meaning that the likelihood that this result came about as a result of the RISE intervention is extremely high.

<sup>21</sup> These findings are confirmed by effect size calculations for each group: formal = 0.80, non-formal = 0.70, and combination = -0.37. In other words, the mean of the formal group is at the 79<sup>th</sup> percentile and the mean of the non-formal group is at the 76<sup>th</sup> percentile of the control group. These estimates suggest that RISE had the largest, positive effect on formal treatment students, followed by non-formal treatment students. However, for combination treatment students, the group mean is at the 35<sup>th</sup> percentile of the control group representing a small to medium, negative impact on combination group students.

Results show the non-formal and formal groups have increased their test scores relative to the control group by approximately 9 (12%) and 11 (14.6%) points.



*Standard One girl taking post-test in a non-formal center.*



*Results confirmed that educator certification and professional development influences learning gains.*

and the treatment formal teachers receive additional teaching materials and pedagogy through the intervention. However, the significantly higher learning gains of the non-formal students relative to the control students demonstrate that non-formal students, even with their fewer contact hours, uncertified teachers, and less formal learning environment, did not just perform as well as the control students but actually performed better. These results show that RISE has not only helped improve learning gains for formal students, but it has helped children who were not previously in the formal system catch up with their peers through non-formal school programming. Reasons for non-formal students' exceptional learning gains will be discussed in the Post-Analysis section.

Figure 2 (on page 24) shows that the highest learning gains were made by the formal group in all three subjects. Formal group scores increased by 4.5 points (18%) in Kiswahili and 3 points (12%) in both English and math.<sup>22</sup> Students in the non-formal group outperformed their control counterparts by about 4 points (16%) in math and Kiswahili, and just under 2 points (8%) in English.<sup>23</sup> Combination group students' scores increased in all three tested subjects over time, though the control group outperformed them by varying degrees in all three subjects. The combination group did worse by nearly 3 points (12%) in English, 1.5 points (6%) in math, and nearly 1 point in Kiswahili than the control group.<sup>24</sup>

Overall, the above results indicate that the formal and non-formal groups represent the most effective service delivery mechanisms for IRI early childhood education in underserved Zanzibari communities. They also show that, in underserved remote communities where access to formal education opportunities is limited, non-formal methods of education can be very successful when effectively implemented.

## OTHER FACTORS INFLUENCING LEARNING GAINS

Results show that a variety of complementary factors play a role in positively affecting test score gains. Factors include these:



*RISE has not only helped improve learning gains for formal students, but it has helped children who were not previously in the formal system catch up with their peers through non-formal school programming.*

<sup>22</sup> Double difference regressions confirmed these three results at the 99% significance threshold.

<sup>23</sup> In all three subjects, these impacts were confirmed as 99% statistically significant.

<sup>24</sup> Double difference regression results confirm this observation at the 99% statistical significance threshold for English and math, though the Kiswahili result does not turn out to be robust.

**Student age** | The actual ages of students surveyed ranged from 4 to 13 years due to late entry and enrolment. We can see from Table 5 (Annex E) that student age positively impacted test scores at the 99% significance level. Though there are a variety of interpretations for this, it is not surprising because older students are expected to either be more advanced than their younger counterparts or to catch up more quickly when they enter education late.

**Preschool education** | Preschool education emerges as the most influential factor affecting learning gains. Students who had previously attended preschool scored nearly 4 points higher (5.3%), on average, than their counterparts who did not attend preschool.<sup>25</sup> Students who attended preschool did noticeably better in English and Kiswahili, and to some extent math, than those who did not. This result is evident, to varying degrees, across delivery groups, subjects, genders, and island locales, regardless of whether this early childhood education took place in an IRI non-formal or formal preschool setting. This finding supports MoEVT’s policy initiative of making preschool education a mandatory component of the basic education system, and it further reinforces the need for projects such as RISE that increase access to and quality of preschool provision in Zanzibar.

**Center/classroom attendance, building structure, and educator age and qualification** | Surprisingly, **center/classroom attendance** is shown to have had little to no effect on student learning, as attendance was relatively high for all groups with little variance. Interestingly, one can also see that students in permanent **structures** appear to score nearly 4 points lower at a 90% significance level. This does not mean that a permanent building has a negative effect on learning gains, but rather that learning in non- and semi-permanent structures did not impede learning. As the treatment group consists of both formal and non-formal schools, further analysis should be conducted between formal and non-formal schools to see how structure type affects learning gains.

Similarly, in terms of **educator age**, having an older educator appears to have a small negative effect. This may be because younger educators were more willing to learn and more effective at learning IRI pedagogy than older educators. Finally, Table 5 (Annex E) shows that having an educator who was **certified** in teaching improved test scores by about 3 points (though this result is barely 90% significant), which confirms the importance of education professional development. Again, these findings need further analysis.<sup>26</sup>



*Preschool education emerges as the most influential factor affecting learning gains. Students who had previously attended preschool scored nearly 4 points higher (5.3%), on average, than their counterparts who did not attend preschool.*



*Center/classroom attendance is shown to have had little to no effect on student learning, as attendance was relatively high for all groups with little variance.*

<sup>25</sup> This is at 99% significance level. See Table 5 (Annex E) for this coefficient.

<sup>26</sup> Fixed effects are not reported because no satisfactory variable was consistently available. Districts, the ideal variable choice administratively, are directly correlated with control and treatment while ward, the level below district, often has samples that are too small for statistical testing. Island is another option, but given the large size of their samples and the fact that there are only two island variables does not make it a useful instrument to include in the heterogeneity regressions. In the end, a regrouped ward variable, which provides for a sufficient number of observations, is included, though very little confidence is put in their estimations. Consequently, fixed effects are not discussed in the contents of this study.



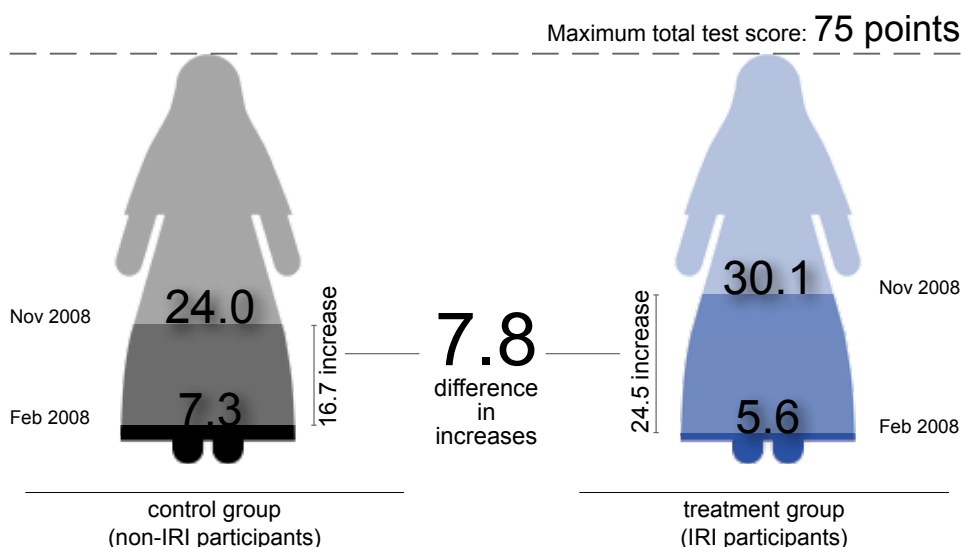
*Student learning gains among treatment group girls are shown to be greater than gains made by treatment group boys, demonstrating that IRI programming is girl-friendly and inclusive.*

# GENDER ANALYSIS

To analyze whether there were differences in project impact for girls or boys, a gender heterogeneity test was conducted.<sup>27</sup> While there are more girls enrolled in primary school in Zanzibar than boys, the number of girls who enroll and complete secondary education drops significantly. Attendance rates did not have a statistically significant impact on achievement in this study and no gender-based difference in attendance was found. However, as gender may affect achievement, a heterogeneity test for gender was conducted to assess whether RISE had a differential impact on girls achievement versus boys.

While attendance was not found to have had a statistically significant impact on achievement, as attendance rates were uniformly high across groups, this heterogeneity test explores if a gender-based achievement gap exists.

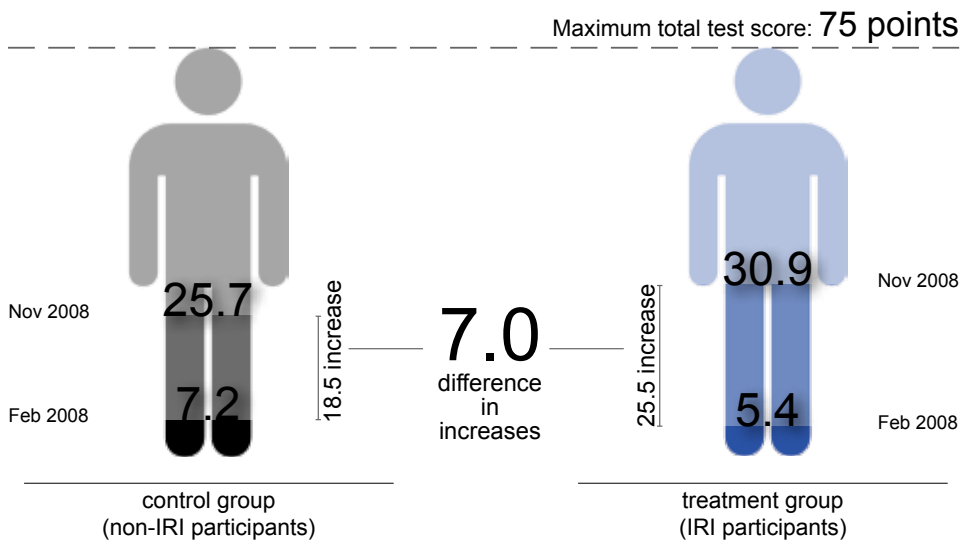
**FIGURE 3 – DOUBLE DIFFERENCE RESULTS BY GENDER**



Although girls had lower pre- and post-test scores than boys, their actual average change (or growth) was higher than that of boys.

<sup>27</sup> A heterogeneity test is used to measure for differential impact that may have occurred as a result of the intervention.





*Boys benefited from IRI programming by about 7 points.*

Figure 3 shows that holding all else constant, boys benefited from IRI programming by about 7 points while girls actually benefited nearly 8 points. Table 8 in Annex H supports these findings, showing that the double difference estimates (or direct IRI impacts) favor girls by approximately 1 point, all at 99% significance levels. This finding suggests that although boys' scores were higher in the end, the direct impact of IRI was greater for girls.<sup>28</sup>

Overall, student learning gains among treatment group girls are shown to be greater than gains made by treatment group boys,<sup>29</sup> demonstrating that IRI programming is girl-friendly and inclusive. Although girls had lower pre- and post-test scores than boys, their actual average change (or growth) was higher than that of boys.

<sup>28</sup> Effect size calculations also illustrate this: female = 0.62 and male = 0.47. In other words, the mean score of the RISE female group is at the 75<sup>th</sup> percentile of the control female group, while the RISE male group is at the 68<sup>th</sup> percentile of the control male group. This represents a medium to large, positive impact of the RISE program on females and a medium, positive impact on males.

<sup>29</sup> This is at a 99% significance level.

...exposure to IRI had a positive impact on students in both islands, but this impact is noticeably larger for students in Pemba.

# ISLAND ANALYSIS

Although the islands and districts, where control and treatment students come from, are reasonably similar for the purposes of analysis, there are some statistically significant differences. Pemba has lower income, asset acquisition, adult educational attainment, and access to health and social services, and therefore an island heterogeneity test was conducted to investigate whether RISE had a different impact on learners from Unguja than those on Pemba.

FIGURE 4 – DOUBLE DIFFERENCE RESULTS BY ISLAND

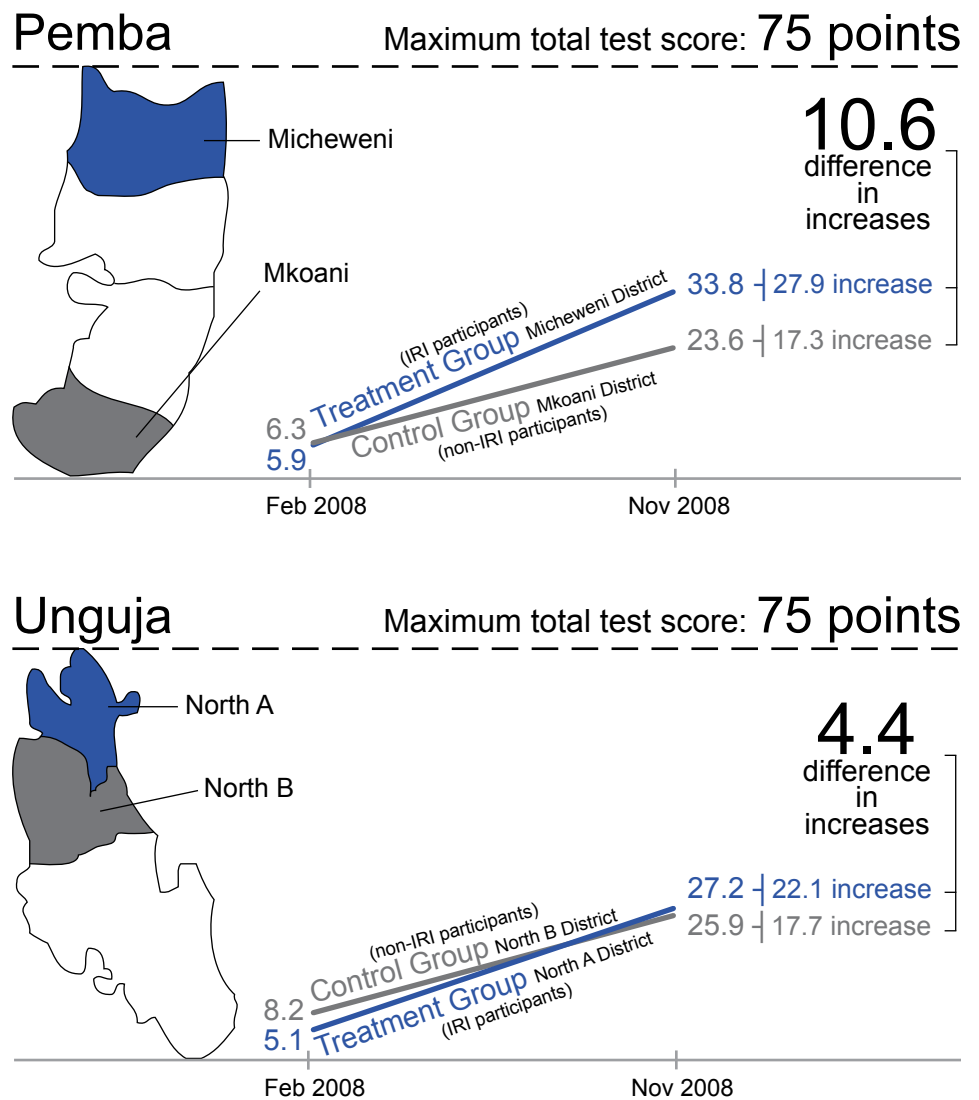


Figure 4 illustrates that, although both control and treatments groups in Pemba and Unguja improved their scores over time, students in Pemba scored much higher on post-tests than their counterparts in Unguja. Holding all else constant, Pemban students' improved on tests by 10.6 points (14.1%), whereas Ungujan students improved by 4.4 points (5.9%) at a 99% significance level.<sup>30</sup> These results suggest that exposure to IRI had a positive impact on students in both islands, but this impact is noticeably larger for students in Pemba.

Higher learning gains in Pemba than in Unguja are consistent with other national education indicators and statistics. For example, in scores for the 2008 Form Two (secondary school) exams, 9 of the 10 top-performing schools are located in Pemba (MoEVT, 2009, p. 61). Also, the number of students who passed the Standard Seven (final year in primary school) exams in 2008 was nearly equal for Pemba and Unguja, but a higher number of students from Pemba were admitted into specialized schools (which is an indicator of level achievement on exams, as specialized schools only admit high-achieving students) (MoEVT, Department of Curriculum and Examinations, 2008).

As RISE is trying to serve students in both islands equally, further investigation and research (using both quantitative and qualitative instruments) should be conducted to evaluate why differentiated educational learning gains according to islands occurred.



*Students in Pemba scored much higher on post-tests than their counterparts in Unguja.*

<sup>30</sup> In terms of effect size, Pemba = 0.77 and Unguja = 0.32. In other words, the mean score for Pemba students is at the 78<sup>th</sup> percentile of the control group, and at the 63<sup>rd</sup> percentile for Unguja students. See Table 9 (Annex I) for the data analysis. Although RISE's impacts are positive on both islands, they are larger on Pemba than on Unguja.



*The hypothesis that IRI beneficiaries would perform better than the control group on benchmark tests as a result of the RISE intervention was proven to be true.*

## POST-ANALYSIS:

### REASONS FOR THE DIFFERENCE IN PERFORMANCE ACROSS THE TREATMENT GROUPS

---

The overall hypothesis of this impact study stated that the treatment sample of treatment student beneficiaries will perform better on benchmark tests *as a result of the RISE intervention* than will a group of control students. This was found to be true. However, it was also hypothesized that change in performance among students in the treatment formal and combination groups would be higher than the change in performance among students in the control group, due to the additional inputs provided by RISE. Although the formal group outperformed the control group, the combination group disproved the hypothesis and actually did worse. Likewise, it was hypothesized that change in performance among the control group students would be slightly higher than that of students in the non-formal treatment group, as formal schools have certified educators, additional resources, and other inputs that non-formal classrooms (centers) do not have access to. However, the non-formal group actually had higher learning gains than control students. Possible factors that may explain why the findings diverged from the initial hypotheses are below.

### LOW PERFORMANCE OF THE COMBINATION GROUP

In order to investigate why the findings for the combination model disproved the hypothesis—and to identify any unique circumstances or factors that may have influenced these findings—after the final analysis of the findings, RISE staff and district coordinators conducted interviews with mentors, teachers, head teachers, and other individuals who were involved with the combination model.

### MANAGEMENT AND COORDINATION

Observations and key informant interviews suggest that the most significant factor contributing to the lower performance of this group is challenges in management and coordination between non-formal IRI centers and the formal schools. Aspects identified as problematic include these:



*Non-formal group had higher learning gains than control students from formal classrooms.*



<b>Consistent release time</b>	In theory, the combination model required teachers from the formal school classes to release the IRI students from their classes early enough for them to walk the distance to their IRI center for the TuTu radio broadcast. However, in reality few teachers regularly released students on time, if at all. Consequently, students were often late for lessons and only received partial lessons, even though they were recorded as being in attendance.
<b>Adult accompaniment</b>	The children were supposed to be accompanied on the journey from the school to the IRI center by their assistant mentor, to ensure that they arrived on time. However, in practice this was not always done. For example, in one ward in Unguja, assistant mentors from neighboring clubs rarely went to the school to accompany the children and, as a consequence, the head teacher was pressured not to release unaccompanied children. Similar incidents occurred in two other locales.
<b>Distance</b>	IRI centers were supposed to be located near enough to the formal school that distance would not negatively impact student punctuality and attendance. However, not all communities successfully situated (or resituated) centers in the recommended proximity, and so distance contributed to tardiness and dependence on adult accompaniment.
<b>Mentor-teacher communication</b>	There was no official mechanism for regular communication between teachers and mentors working with the same students in the combination group. As a result the problems described above were not effectively resolved.



*RISE classrooms encourage a “play to learn” environment and student-educator interaction.*

## **PEDAGOGICAL AND ENVIRONMENTAL DIFFERENCES BETWEEN NON-FORMAL AND FORMAL CLASSROOMS**

RISE’s IRI pedagogy is interactive, child-centered, and integrates subject content. It differs greatly from formal instruction methodologies used in Zanzibar schools, which tend to be more didactic and teacher-directed with clear divisions between subject content. Parents and educators reported that many children found it difficult to make the transition from a non-formal IRI center (preschool) to a formal Standard One classroom. It was difficult for children who had begun their learning in a small, “play to learn” environment to adapt to a large, “chalk and talk”-style formal classroom. Some teachers reported to RISE staff that these children found it more difficult to sit quietly and concentrate throughout the lesson, with minimal teacher-student interaction, than children who had not participated in IRI centers.

Finally, the formal school teachers of this group did not receive IRI training and therefore could not construct links between the TuTu radio programs and activities, and their classroom lessons.



*It was difficult for children who had begun their learning in a small, “play to learn” environment to adapt to a large, “chalk and talk”-style formal classroom.*



*The findings and subsequent analysis of this group has helped inform further project design and IRI delivery for subsequent years. By 2010 all formal school teachers near non-formal IRI centers will receive IRI training to use in their classroom.*

## **DIFFICULTIES AT THE SCHOOL LEVEL**

When the RISE project began its first non-formal preschool intervention in 2007, it intentionally targeted the hardest-to-reach communities in the beneficiary districts as identified by central MoEVT indicators and directives. In the case of Micheweni, Pemba, all the combination group IRI centers were located in the village of Wingwi. Wingwi not only has a large number of out-of-school Standard One-age children in the community, but the Wingwi Primary School has large classes and major resource and space constraints. According to MoEVT's 2008 National Examination Statistics, Wingwi Primary School had lower pass rates (69.1%) for Standard Seven students (an indicator of primary school performance) than the average for the entire Micheweni district (82.7%).

In Unguja, it is difficult to compare the education indicators for the combination group to other formal schools in the control group, as three of the four combination schools were new and did not yet have any performance indicators available. New schools have the added challenge of developing effective school management; recruiting, retaining, and orientating teachers; and enrolling and encouraging regular student attendance. Therefore the “newness” of the group schools may have an impact on these new schools' ability to effectively coordinate with external educational projects such as RISE.

Although the combination group had lower learning gains than expected, the findings and subsequent analysis of this group has helped inform further project design and IRI delivery for subsequent years. By 2010 all formal school teachers near non-formal IRI centers will receive IRI training to use in their classroom. Therefore all non-formal treatment students will continue to receive IRI programming after they shift to formal schools.

## POSSIBLE REASONS WHY THE NON-FORMAL GROUP HAS OUTPERFORMED THE CONTROL GROUP

Further interviews were conducted to investigate why the non-formal group outperformed the control group and disproved the hypothesis. Possible reasons may include these:

<b>IRI methodology</b>	The IRI methodology that RISE employs is based on child-friendly pedagogy that is designed to be inclusive, playful, active, and engaging for young students. This pedagogy likely facilitates more effective and sustained learning, as students are likely to actively participate in the learning activities and reflect on their learning.
<b>Class Sizes</b>	The target class size for non-formal IRI centers is 25 children, compared to a target size of 45 children for formal government school classes. Therefore students in the non-formal group benefited from a higher level of individual interaction with their mentor than students in the control group classes.
<b>Contact/ instruction time</b>	Although students in non-formal IRI centers attended fewer hours of instruction than students in the control group classes, the amount of actual contact or instruction time that students in the non-formal group received may have been comparatively higher because less time was spent on behavior and classroom management than in formal school classrooms.
<b>Learning materials</b>	Most formal school classes in Zanzibar experience a consistent shortage of teaching and learning materials, which was likely the case in the control group classes. In contrast, each new IRI center received a blackboard, a teaching guidebook, and a materials kit including slates, chalk, scissors, dice, and string, as well as stories and flashcards. In addition, IRI mentors are trained and encouraged to use local materials such as sticks, bottle caps, seeds, fabric swatches, and shells, which can be collected at little to no cost. RISE staff monitor center materials and ensure kits and supplies are replenished at the start of each year.



*The IRI methodology that RISE employs is based on child-friendly pedagogy that is designed to be inclusive, playful, active, and engaging for young students.*



*Although students in non-formal IRI centers attended fewer hours of instruction than students in the control group classes, the amount of actual contact or instruction time that students in the non-formal group received may have been comparatively higher because less time was spent on behavior and classroom management than in formal school classrooms.*

# CONCLUSION

---

Substantial test score gains across all three tested disciplines (Kiswahili, math, and English) show that RISE’s IRI programming and approach have increased learning gains in both formal and non-formal settings in Zanzibar relative to a control group. Given that district-level indicators were higher for the control group, and the treatment group consists of both non-formal and formal students, the treatment group’s gain of 7.5 points, representing a medium impact (based on effect size calculation), is encouraging.

Three different models (non-formal, formal, and combination) were used to deliver IRI Standard One programs to students in Zanzibar at the time of this study. Although students in formal IRI classrooms made the most significant learning gains of all the treatment and control groups, non-formal treatment students were not far behind. Non-formal and formal groups increased their test scores relative to the control group by approximately 9 (representing a 12% increase) and 11 points (14.6% increase), respectively, as a result of RISE interventions.<sup>31</sup> It is not surprising that the formal treatment group had higher learning gains than the control group, as they have similar learning environments and the treatment formal teachers received additional teaching materials and pedagogy through the intervention. However, the significantly higher learning gains of the non-formal group relative to the control group demonstrate that non-formal students, even with their fewer contact hours, uncertified teachers, and less formal learning environment, were able to catch up with their peers through non-formal school programming.

Although the combination group had lower learning gains than expected, the findings and subsequent analysis of this group will inform project design and IRI delivery for subsequent years. Results also showed that a variety of complementary factors play a role in positively affecting test score gains. Preschool education emerges as the most influential of these factors. Students who had previously attended preschool scored nearly 4 points higher, on average, than their counterparts who did not attend preschool. Finally, findings showed that while boys and girls benefited from the RISE intervention, girl students showed greater overall growth, demonstrating that IRI programming is girl-friendly and inclusive.

The detailed findings of this robust impact study demonstrate that RISE’s unique combination of IRI radio programming and early childhood education not only increases access and engages learners, but also promotes the quality of their learning. Although RISE is currently only serving students and educators in 2 of Zanzibar’s 10 districts, IRI could be an effective model for furthering policy objectives and improving access and learning gains for other learners across the archipelago.

---

<sup>31</sup> This is at a 99% statistical significance level, meaning that the likelihood that this result came about as a result of the RISE intervention is extremely high.



# REFERENCES

---

- Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd ed.). Hillsdale, NJ: Erlbaum.
- Glass, G. V. (1976). Primary, secondary, and meta-analysis of research. *Educational Researcher*, 5(10), 3–8.
- Ho, J., & Thukral, H. (2009). *Tuned in to student success, assessing the impact of Interactive Radio Instruction for the hardest-to-reach*. Washington, DC: Education Development Center, Inc.
- Maluccio, J. (2005, February). Coping with the “coffee crisis” in Central America: The role of the Nicaraguan *Red de Proteccion Social*. *RFCND Discussion Paper*. Washington, DC: IFPRI.
- Ministry of Education and Vocational Training, Revolutionary Government of Zanzibar. (2006). *Education Policy*.
- Ministry of Education and Vocational Training, Revolutionary Government of Zanzibar. (2007, February 6). *Zanzibar Education Development Programme 2008/2009–2015/16*. Draft 3.
- Ministry of Education and Vocational Training, Revolutionary Government of Zanzibar. (2009, July). *Budget Speech*.
- Ministry of Education and Vocational Training, Revolutionary Government of Zanzibar. (2008) *2008 Data (Exams and Statistics)*.
- Ravallion, M. (2001). The mystery of the vanishing benefits: Ms. Speedy Analyst’s introduction to evaluation. *World Bank Economic Review*, 15(1), 115-140.
- Research Methods Knowledge Base*. Retrieved February 28, 2009, from [http://www.socialresearchmethods.net/kb/stat\\_t.php](http://www.socialresearchmethods.net/kb/stat_t.php).
- Revolutionary Government of Zanzibar. (2006, September). *2004-2005 Household Budget Survey 2004–2005*.
- Skoufias, E. (2005). *PROGRESA and its impacts on the welfare of rural households in Mexico*. *Research Report 139*. Washington, DC: IFPRI.
- UNESCO. (2006). *Strong Foundations: Early childhood care and education*. *Education for all global monitoring report 2007*. Paris: UNESCO.
- UNESCO Institute for Statistics. *Indicators on teaching staff at ISCED levels 0 to 3*. Retrieved June 23, 2009, from <http://stats.uis.unesco.org/unesco/TableViewer/tableView.aspx?ReportId=165>.
- United Republic of Tanzania, National Bureau of Statistics. (2002). *Population and Housing Census*.

# ANNEXES

## ANNEX A

### Standard One: Oral Section

#### Kiswahili

##### 1. Reading

Sentence	Good	Medium	Very little	None
Juma hali mboga				
Baba anasali suna				
Mjomba haendeshi chombo				

##### 2. Say 10 letters in Kiswahili.

--	--	--	--	--	--	--	--	--	--

#### Math

##### 3.

	Good	Medium	Very little	None
Count 1 to 10				
Count 2 to 20 in twos				

#### English

##### 4. Count in English.

1	2	3	4	5	6	7	8	9	10
---	---	---	---	---	---	---	---	---	----

##### 5. Name these letters in English.

a	f	e	q	t	o	p	u	x	v
---	---	---	---	---	---	---	---	---	---

##### 6. Name any 2 foods that you eat at home in English.

a. \_\_\_\_\_ b. \_\_\_\_\_

##### 7. Name any 2 articles of clothing in English.

a. \_\_\_\_\_ b. \_\_\_\_\_

##### 8. Greet someone in the morning in English. (yes/no)

##### 9. Greet someone in the afternoon in English. (yes/no)

##### 10. Ask if you can go outside in English. (yes/no)

### Standard One: Writing Section

#### Kiswahili

##### 1. Write your name (first name, father's name)

\_\_\_\_\_

##### 2. Dictation (adult reads and student writes the word)

(1) \_\_\_\_\_ (2) \_\_\_\_\_

(3) \_\_\_\_\_ (4) \_\_\_\_\_

(5) \_\_\_\_\_

#### English Dictation

(adult names a number in English and student has to write the numeral)

3. (1) \_\_\_\_\_ (2) \_\_\_\_\_ (3) \_\_\_\_\_ (4) \_\_\_\_\_

(5) \_\_\_\_\_

#### Math

4.	21	13	16	19	21
	+ 15	+5	-9	-11	-19
	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

5.  $12 + 7 =$         $20 - 12 =$

## ANNEX B

This double difference method is illustrated in Table 2 and its estimation equation is found below the table.

TABLE 2 – DOUBLE DIFFERENCE APPROACH

	TREATMENT GROUP (T)	CONTROL GROUP (C)	DIFFERENCE ACROSS GROUPS
Follow Up (1 = Post-Test)	$T_1$	$C_1$	$T_1 - C_1$
Baseline (0 = Pre-Test)	$T_0$	$C_0$	$T_0 - C_0$
Difference Across Time	$T_1 - T_0$	$C_1 - C_0$	$(T_1 - C_1) - (T_0 - C_0) = (T_1 - T_0) - (C_1 - C_0)$

$$(1) E_{ict} = \alpha_0 + \alpha_1 Y_t + \alpha_2 P_c + \delta_1 Y_t P_c + (\mu_i + v_{ict}),$$

$E_{ict}$  is the outcome variable (test scores),  $Y_t$  represents time,  $P_c$  represents participation in RISE,  $Y_t P_c$  represents the interaction between participation in the program and time,  $(\mu_i + v_{ict})$  represents controls for observed and unobserved household time invariant factors and time variant errors (respectively),  $\alpha$ s represent unknown parameters, and  $\delta_1$  represents the double difference impact. To be clear,  $(\mu_i + v_{ict})$  are the control variables identified in the Control Variable section starting on page 17 that account for the statistically significant time variant and invariant differences between control and treatment groups. All of these control variables were included in the regressions because they were either significantly different between control and treatment groups, or they measure an important factor or category (directly or as a proxy) that could influence the dependent variable.

Effect size is a simple way of quantifying differences between groups. In examining the impact of the RISE intervention on student test scores, effect size provides a standardized metric by which the impact of the intervention can be measured. Where differences in mean scores exist between IRI and non-IRI students, effect size measures allow us to interpret how *big* (and thus, significant) the difference really is.

As shown in the equation below, the numerator of the effect size calculation is the difference in mean scores between treatment (IRI) and control (non-IRI) groups. The mean scores for the treatment and control groups account for change over time (mean post-test minus mean pre-test). Meanwhile, in the denominator of the equation, the standard deviation of the control group accounts for the variability in post-test scores relative to the mean. Generally, accounting for the variability of the scores in the effect size allows researchers to talk about the magnitude (and significance) of a difference in mean scores, using a standardized metric. This approach relies on the work by Jacob Cohen and Gene V. Glass (1976). Per Cohen's work, it is common to categorize effect sizes 0.2 to 0.3 as small, around 0.5 as medium, and equal to or greater than 0.8 as being large effects.

$$\text{Effect size} = \frac{\text{Mean of treatment group scores} - \text{mean of control group scores}}{\text{Standard Deviation (variance in scores from the mean) of Control Group}}$$

## ANNEX C

TABLE 3 – MEAN CENTER AND STUDENT VARIABLES FOR TREATMENT AND CONTROL GROUPS  
(T-Test Analysis)

VARIABLES	TOTAL	CONTROL (C <sub>0</sub> )	TREATMENT (T <sub>0</sub> )	DIFFERENCE (C <sub>0</sub> – T <sub>0</sub> )	SIGNIFICANCE LEVEL
<b>Center</b>					
Non-permanent structure	0.103	0.000	0.161	-0.161	***
Semi-permanent structure	0.196	0.000	0.307	-0.307	***
Permanent structure	0.701	1.000	0.532	0.468	***
Female educator	0.631	0.636	0.628	0.009	***
Educator age	35.12	40.01	32.38	7.628	***
Educator education attainment <sup>1</sup>	0.765	0.856	0.714	0.142	***
Educator certification <sup>2</sup>	0.632	1.000	0.425	0.575	***
Head teacher/sheha education <sup>3</sup>	0.701	1.000	0.532	0.468	***
Head teacher/sheha certification <sup>4</sup>	0.485	0.591	0.425	0.166	***
Class size ratio <sup>5</sup>	1.239	1.263	1.225	0.038	***
Radio programs heard <sup>6</sup>	0.603	0.000	0.941	-0.941	***
Center/class attendance <sup>7</sup>	0.821	0.896	0.779	0.118	***
<b>Student</b>					
Male	0.550	0.490	0.583	-0.093	***
Age	7.686	7.202	7.377	-0.174	***
Special needs	0.027	0.003	0.012	-0.009	***
Preschool education	0.105	0.236	0.189	0.047	***
Repetition	0.006	0.011	0.003	0.008	*
<b>Test Scores<sup>8</sup></b>					
Kiswahili pre-test	1.636	1.307	1.821	-0.514	***
English pre-test	2.058	3.132	1.455	1.676	***
Math pre-test	2.440	2.847	2.212	0.635	***
Complete pre-test	6.135	7.286	5.488	1.797	***
Kiswahili post-test	8.393	5.968	9.756	-3.789	***
English post-test	11.18	11.15	11.20	-0.06	
Math post-test	8.922	7.695	9.611	-1.915	***
Test post-test	28.50	24.81	30.57	-5.76	***

<sup>1</sup> Percentage of center teachers or mentors who have completed Form 4.

<sup>2</sup> Percentage of educators who have received teacher certification.

<sup>3</sup> Percentage of head teachers or shehas who have completed Form 4.

<sup>4</sup> Percentage of head teachers who have received management certification.

<sup>5</sup> A ratio of class size over class capacity (i.e., larger than 1 is above capacity and vice versa).

<sup>6</sup> Percentage of radio programs class listened to (i.e., 1 = 80 radio programs or 100%).

<sup>7</sup> Percentage reported monthly.

<sup>8</sup> Complete tests are a maximum of 75 points. As such, each individual component (Kiswahili, English, and math) is based on 25 points.

\*\*\* Indicates significance above 99%.

\*\* Indicates significance above 95%.

\* Indicates significance above 90%.



## ANNEX D

TABLE 4 – MEAN DISTRICT VARIABLES FOR TREATMENT AND CONTROL GROUPS<sup>1</sup>  
(T-Test Analysis)

VARIABLES	TOTAL	CONTROL (C <sub>0</sub> )	TREATMENT (T <sub>0</sub> )	DIFFERENCE (C <sub>0</sub> – T <sub>0</sub> )	SIGNIFICANCE LEVEL
<b>Demographic</b>					
Population <sup>2</sup>	79,237	71,294	83,698	-12,405	***
Mean household size	5.277	5.235	5.300	-0.065	***
Female headed household	0.202	0.209	0.198	0.011	***
<b>Education</b>					
Adult education <sup>3</sup>	0.449	0.555	0.389	0.166	***
Adult no education	0.435	0.343	0.486	-0.143	***
Adult literacy	0.565	0.657	0.514	0.143	***
<b>Infrastructure</b>					
Primary school within 2 km	0.640	0.665	0.626	0.040	***
Secondary school within 5 km	0.886	0.955	0.848	0.106	***
Health facility within 5 km	0.949	0.958	0.943	0.015	***
<b>Dwelling</b>					
Electricity	0.046	0.071	0.032	0.039	***
Piped water	0.788	0.857	0.749	0.108	***
Charcoal or firewood	0.983	0.981	0.984	-0.003	***
Metal roof	0.470	0.511	0.447	0.065	***
Toilet	0.391	0.472	0.346	0.127	***
<b>Assets</b>					
Radio	0.726	0.804	0.682	0.122	***
Telephone	0.056	0.069	0.048	0.021	***
<b>Income &amp; Poverty</b>					
Mean income <sup>4</sup>	154,572	181,669	139,350	42,320	***
Agricultural primary activity	0.507	0.459	0.534	-0.075	***
Agricultural income share	0.202	0.231	0.186	0.045	***
Food poor <sup>5</sup>	0.182	0.098	0.230	-0.132	***
Poor <sup>6</sup>	0.573	0.454	0.639	-0.186	***
<b>Expenditures</b>					
Per capita expenditures <sup>7</sup>	16,975	18,428	16,158	2,270	***
Household food expenditure share <sup>8</sup>	0.618	0.596	0.631	-0.035	***

<sup>1</sup> Unless otherwise noted, estimates are sourced from the *Zanzibar 2004-2005 Household Budget Survey*

<sup>2</sup> Population figures sourced from 2002 Population and Housing Census

<sup>3</sup> Percentage of adults (15 or older) with 5 or more years of education.

<sup>4</sup> Income in Tanzanian shillings.

<sup>5</sup> Head count ratio below Zanzibar food poverty line.

<sup>6</sup> Head count ratio below Zanzibar basic needs poverty line.

<sup>7</sup> Per capita expenditures are reported as monthly.

<sup>8</sup> Household food expenditure shares are reported as monthly.

\*\*\* Indicates significance above 99%.

\*\* Indicates significance above 95%.

\* Indicates significance above 90%.

## ANNEX E

TABLE 5 – OVERALL DOUBLE DIFFERENCE RESULTS  
(Regression Analysis)

VARIABLES		RISE NO CONTROLS	RISE CONTROLS
Time	(Coefficient)	17.5261***	17.5261***
	(T-Statistic)	27.330	28.190
Treatment		-1.7972***	2.6672**
		-5.965	2.150
Time*treatment	(DD)	7.5574***	7.5574***
		8.715	9.198
Age			1.5244*** 7.848
Male			1.1927*** 2.795
Preschool education			3.7341*** 4.191
Center attendance			0.004 0.138
Permanent structure			-3.6597* -1.733
Class size ratio			3.9838*** 2.609
Female educator			-0.108 -0.154
Educator age			-0.0795* -1.865
Educator certification			2.962 1.640
Constant		7.2856***	-6.9533**
		27.900	-2.019
Observations		3086	3086
R-Squared		0.465	0.536

\*\*\* Indicates significance above 99%.

\*\* Indicates significance above 95%.

\* Indicates significance above 90%.

RISE Effect Size: 0.54688417 | Medium

## ANNEX F

**TABLE 6 – DOUBLE DIFFERENCE RESULTS BY SUBJECT**  
(Regression Analysis)

VARIABLES		ENGLISH NO CONTROLS	ENGLISH CONTROLS	KISWAHILI NO CONTROLS	KISWAHILI CONTROLS	MATH NO CONTROLS	MATH CONTROLS
Time	(Coefficient)	8.0171***	8.0171***	4.6604***	4.6604***	4.8486***	4.8486***
	(T-Statistic)	29.740	31.760	18.890	19.610	16.610	16.990
Treatment		-1.6761***	0.313	0.5141***	1.6981***	-0.6353***	0.656
		-9.592	0.696	4.428	3.287	-6.046	1.116
Time*treatment	(DD)	1.7324***	1.7324***	3.2744***	3.2744***	2.5506***	2.5506***
		5.117	5.469	9.593	10.100	6.652	6.992
Age			0.4960***		0.5022***		0.5263***
			6.871		6.508		6.199
Male			0.3098*		0.7122***		0.171
			1.947		4.197		0.924
Preschool education			1.9549***		1.5609***		0.218
			6.037		4.112		0.608
Center/class attendance			0.013		-0.016		0.007
			1.183		-1.291		0.545
Permanent structure			-0.168		-0.328		-3.1646***
			-0.220		-0.395		-3.381
Class size ratio			1.0053*		2.8543***		0.124
			1.737		4.444		0.202
Female educator			0.5976**		-0.5240*		-0.182
			2.462		-1.921		-0.573
Educator age			-0.007		-0.0349**		-0.0374*
			-0.458		-2.182		-1.896
Educator certification			-0.092		0.416		2.6378***
			-0.145		0.564		3.185
Constant		3.1315***	-4.1150***	1.3072***	-4.2897***	2.8468***	1.451
		20.260	-3.354	14.920	-3.100	29.520	0.973
Observations		3086	3086	3086	3086	3086	3086
R-Squared		0.508	0.573	0.357	0.433	0.281	0.378

\*\*\* Indicates significance above 99%.

\*\* Indicates significance above 95%.

\* Indicates significance above 90%.

English Effect Size: 0.28779386 | Small

Kiswahili Effect Size: 0.69296193 | Large to Medium

Math Effect Size: 0.46953358 | Medium

## ANNEX G

TABLE 7 – DOUBLE DIFFERENCE RESULTS BY GROUP  
(Regression Analysis)

VARIABLES		COMBINATION NO CONTROLS	COMBINATION CONTROLS	NON-FORMAL NO CONTROLS	NON- FORMAL CONTROLS	FORMAL NO CONTROLS	FORMAL CONTROLS
Time	(Coefficient)	17.5261***	17.5261***	17.5261***	17.5261***	17.5261***	17.5261***
	(T-Statistic)	27.310	28.380	27.310	28.430	27.320	28.330
Treatment		-1.7700***	-6.2152**	-3.8767***	3.226	-0.7438**	-3.8831***
		-4.141	-2.534	-11.550	1.080	-2.196	-2.735
Time*treatment	(DD)	-5.1194***	-5.1194***	9.7248***	9.7248***	11.1003***	11.1003***
		-4.345	-4.601	7.409	8.179	11.200	11.690
Age			0.9795***		1.3499***		1.4605***
			3.989		5.061		6.905
Male			0.517		1.4513***		1.2079**
			0.929		2.635		2.464
Preschool education			4.6806***		4.7115***		4.5381***
			3.989		4.087		4.757
Center/class attendance			0.1140***		-0.1669**		-0.1714***
			3.051		-2.234		-3.274
Class size ratio			4.3963**		12.9560***		7.5349***
			2.214		4.364		3.597
Female educator			4.1257***		3.9180***		1.036
			4.201		3.316		1.100
Educator age			-0.076		-0.1066**		-0.044
			-1.334		-2.099		-0.810
Constant		7.2856***	-14.7670**	7.2856***	-4.556	7.2856***	1.632
		27.880	-2.331	27.880	-0.612	27.890	0.264
Observations		1496	1496	1648	1648	2162	2162
R-Squared		0.393	0.449	0.456	0.534	0.525	0.566

\*\*\* Indicates significance above 99%.

\*\* Indicates significance above 95%.

\* Indicates significance above 90%.

Combination Effect Size: -0.3704609 | Small to Medium

Non-Formal Effect Size: 0.70372857 | Large

Formal Effect Size: 0.80326544 | Large



## ANNEX H

TABLE 8 – DOUBLE DIFFERENCE RESULTS BY GENDER  
(Regression Analysis)

VARIABLES		FEMALE	FEMALE	MALE	MALE
		NO	CONTROLS	NO	CONTROLS
Time	(Coefficient)	16.6449***	16.6449***	18.4430***	18.4430***
	(T-Statistic)	20.630	21.020	18.400	19.410
Treatment		-1.7546***	-8.9256***	-1.8137***	1.923
		-4.160	-3.982	-4.155	1.219
Time*treatment	(DD)	7.9158***	7.9158***	7.0145***	7.0145***
		6.398	6.786	5.621	5.993
Age			1.6395***		1.4020***
			6.091		4.952
Preschool education			1.781		4.8091***
			1.178		4.233
Center attendance			-0.028		0.026
			-0.566		0.690
Permanent structure			2.113		-7.7479***
			0.656		-2.745
Class size ratio			7.2620***		2.763
			2.897		1.416
Female educator			1.026		-0.336
			0.898		-0.380
Educator age			-0.1991***		0.007
			-3.268		0.121
Educator certification			-1.343		5.7919**
			-0.478		2.457
Constant		7.3286***	-5.044	7.2408***	-9.0691**
		21.040	-0.943	18.510	-1.994
Observations		1390	1390	1696	1696
R-Squared		0.451	0.530	0.476	0.555

\*\*\* Indicates significance above 99%.

\*\* Indicates significance above 95%.

\* Indicates significance above 90%.

Female Effect Size: 0.62301637 | Medium to Large

Male Effect Size: 0.4710904 | Medium

## ANNEX I

TABLE 9 – DOUBLE DIFFERENCE RESULTS BY ISLAND  
(Regression Analysis)

VARIABLES		PEMBA	PEMBA	UNGUJA	UNGUJA
		NO	NO	NO	UNGUJA
		CONTROLS	CONTROLS	CONTROLS	CONTROLS
Time	(Coefficient)	17.3027***	17.3027***	17.7245***	17.7245***
	(T-Statistic)	18.620	19.110	20.170	20.620
Treatment		-0.376	0.578	-3.1201***	-1.8461**
		-0.868	0.718	-7.592	-2.533
Time*treatment	(DD)	10.5959***	10.5959***	4.4394***	4.4394***
		8.586	8.817	3.709	3.933
Age			1.1944***		1.8323***
			4.867		6.087
Male			-0.943		2.8988***
			-1.506		5.043
Preschool education			-2.6472***		0.850
			-2.730		0.818
Center attendance			-0.0882*		-0.064
			-1.907		-1.634
Permanent structure			2.547		5.6410***
			1.089		4.965
Class size ratio			4.9986***		7.4027***
			2.944		4.491
Female educator			2.0371***		-0.464
			2.752		-0.386
Educator age			-0.1418***		-0.020
			-2.601		-0.369
Educator certification			0.606		-
			0.355		-
Constant		6.2701***	1.130	8.1871***	-14.0433***
		16.870	0.273	22.840	-3.020
Observations		1528	1528	1558	1558
R-Squared		0.519	0.547	0.428	0.514

\*\*\* Indicates significance above 99%.

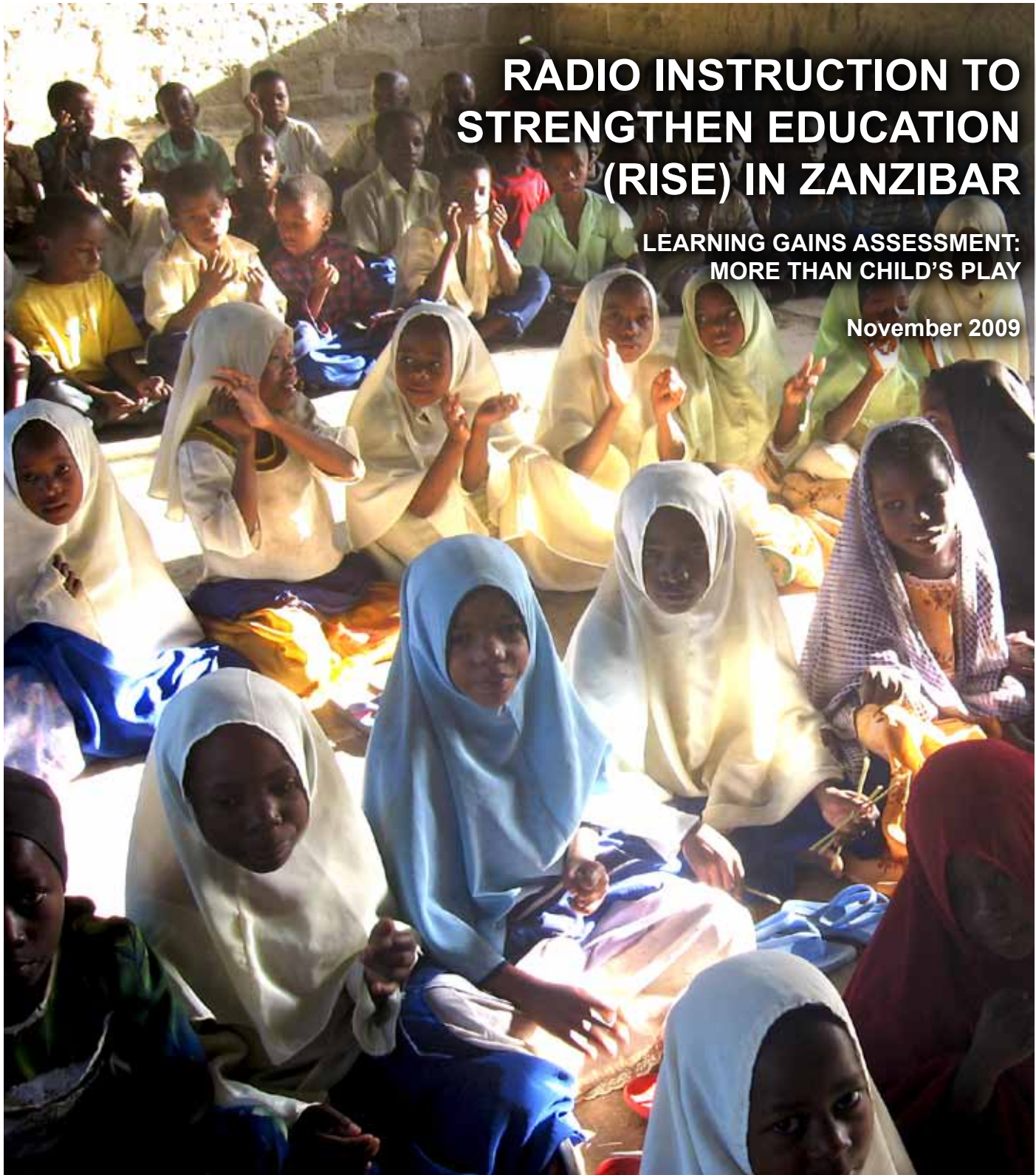
\*\* Indicates significance above 95%.

\* Indicates significance above 90%.

Pemba Effect Size: 0.7735741 | Large

Unguja Effect Size: 0.32028337 | Small





# RADIO INSTRUCTION TO STRENGTHEN EDUCATION (RISE) IN ZANZIBAR

LEARNING GAINS ASSESSMENT:  
MORE THAN CHILD'S PLAY

November 2009

*Students that participate in the RISE project show that IRI is more than just child's play.*



**USAID**  
FROM THE AMERICAN PEOPLE

