



**MindLeaps creates dance programs for street children and out-of-school youth in post-conflict and developing countries. MindLeaps uses a kinesthetic-based curriculum to improve the cognitive skills of youth to ensure they can go to school, enter the workplace and leap forward in life.**

## **MindLeaps Research 2014 – 2016**

### ***A Mixed Methods Approach: Enhancing Cognitive and Non-Cognitive Skills through Dance***

MindLeaps is an international non-governmental organization (NGO) that uses dance to develop critical cognitive and psycho-social skills in street children and out-of-school youth. Working in post-conflict and developing countries, MindLeaps recruits children who have little hope to survive and changes their mindset, preparing them to leap forward in life. To date, the organization has concentrated its work in countries affected by genocide and ethnic conflict: Rwanda, Bosnia-Herzegovina and Guinea.

“Dance is able to change these children’s mindsets,” says founder Rebecca Davis, “But that is only the first step. We have a responsibility to lead these youth out of poverty.”



To do that, MindLeaps’ has formalized a methodology that functions as a bridge program: *youth who struggle to survive day-to-day on the street move to a long-term, positive view with the cognitive skills to go to school, stay in school and succeed in school.* This is achieved through a program targeting 7 skills: memorization, language, teamwork, discipline, grit (perseverance), creativity and self-esteem. MindLeaps integrates its dance program with solutions to food security, child protection, and youth empowerment.

After executing this program for five years in three different countries for over 2,000 youth, MindLeaps attracted the interest of **Carnegie Mellon University**. Researchers wanted to independently analyze how MindLeaps used dance to make street children top academic performers at the most rigorous boarding schools in Rwanda. After two years of field research, three papers about the effectiveness of MindLeaps’ methodology will be published in 2017.



# MindLeaps Research Story, to date...

**Carnegie Mellon University** began studying the impact of MindLeaps' dance program in 2014. In January 2015, MindLeaps began work with Janelle Junkin, a board-certified music therapist and PhD candidate at **Drexel University's** Creative Arts in Therapy as a research practicum student. Building on Carnegie Mellon's research, Ms. Junkin analyzed the weekly data patterns of the skills MindLeaps measures daily. From the analysis, it was determined that students' improvement is statistically significant from Month 1 to Month 3 and again from Month 3 to Month 6.

Groups A, B, C, D, & F have dance class three times/week and each class is two-hours; grades are given three times/week. Group E, the only in-school group, meets on the weekend and is graded two times/week for each two-hour class. In an average month, each student in Groups A, B, C, D, & F will receive 12 data points per skill – for a total of 84 data points per student per month. Group E will receive 8 data points per skill for each student – for a total of 56 data points per student per month. Because grades are collected frequently and regularly for a minimum of one year, the ability to determine statistical significance greatly increases as there are multiple data points available.

In addition to the grades collected, MindLeaps tracks the following information: Gender, Age, Teacher, Grader, Rainy Season, Class Type (i.e. <sup>1</sup>MindLeaps, Contemporary, and Intermediate). Tracking this information allows greater data analysis to determine if grades are impacted by who is teaching, who is grading, gender, whether or not it is the rainy season, and the type of class. For example, the grades achieved in the MindLeaps class vs. the Contemporary class are higher by 0.06. Therefore, MindLeaps knows that grades are generally higher in the MindLeaps class as opposed to the Contemporary class. Below are two graphs that show changes in scores from Month 1 to 3 by Group A using their 2014 data.

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<sup>1</sup> MindLeaps class is the foundational class and is offered the most frequently. The Contemporary class is only offered once a week and only after the 2<sup>nd</sup> month of participation. The Intermediate class is brand new and is only now being offered to select groups.

## OPERATIONAL DEFINITIONS

**Group A** – Group A is the first group of students (20 out-of school-children) who participated in MindLeaps dance program beginning April 2014. (Each new Group of 15 – 20 boys and girls is assigned a letter as an identifier.)

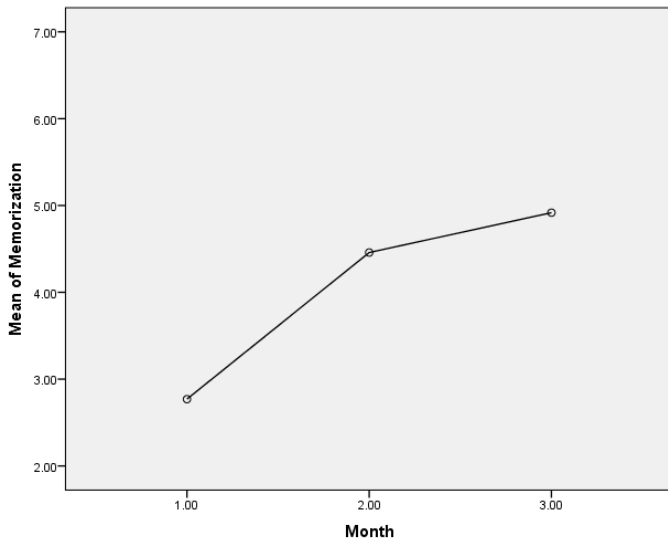
**In total, MindLeaps has six different groups, ordering from Group A to Group F.**

**Grades** – MindLeaps developed a Foundations, Contemporary and Intermediate curriculum designed to generate and support cognitive and non-cognitive development. Each child is graded on seven skills, using a 7-point Likert scale. (See Table 1)

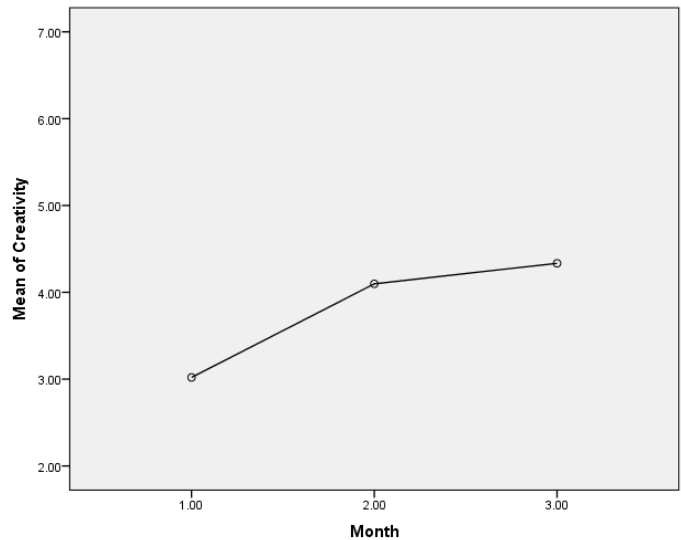
**Skills** – There are seven skills, two cognitive (Language & Memorization) and five non-cognitive skills (Grit, Teamwork, Discipline, Self-Esteem, and Creativity & Self-Expression). Each student receives a numeric score for each skill during every 2-hour class period.

## Example of Cognitive and Non-Cognitive Skills

**Graph 1: Change in Memorization Skill Level Over 3 Months**



**Graph 2: Change in Creativity Skill Level Over 3 Months**



\*Y Axis = Numeric Grade (1-7); X Axis = Cumulative Student Scores from Month 1, 2, & 3 (Group A, 2014)

An independent T test was conducted to compare the scores between the genders: male and female. The results are in the table below and show that both males and females improve their skills at a statistically significant rate.

SKILL	t score	df	P Value
Memorization	22.75	1382	p<.000
Grit	7.27	1381	p<.000
Teamwork	33.22	1380	p<.000
Discipline	25.76	1381	p<.000
Self-Esteem	26.63	1370	p<.000
Creativity & Self-Expression	23.66	1368	p<.000
Language	24.32	1369	p<.000

**Findings:** Based upon the statistically significant findings, MindLeaps determined that *dance classes do support and generate development of cognitive and non-cognitive skills.*

MindLeaps next research step is to determine if all out-of-school children are expected to show the same pattern (statistically significant increases) as those out-of-school children who opt in to the MindLeaps program.

# Participatory Action Research

## Research Question

Are the children who participate in MindLeaps representative of the children “on” or “of” the<sup>2</sup>street?

## Methodology

For this study, Ms. Junkin developed a data collection method, Participatory Action Research, with the assistance of four identified MindLeaps youth and with Dr. Michael Leeds, an economist at **Temple University** who recommended MindLeaps consider the question of selectivity bias. Ms. Junkin trained four MindLeaps youth to conduct a survey collecting comparison data about children living on the streets. These staff, trained by Ms. Junkin, collected identical information on street children in the MindLeaps program.

Using the Heckman Analysis, the research compared the results of the “children living on the street *not* in MindLeaps” with the “children living on the street who *are* in MindLeaps”.

## Example of Selectivity Bias Results

During the data collection period, the surveys collected the following about out-of-school children who participate in MindLeaps and those who do not.

- **Where do you sleep at night?**
- **How often do you eat?**
- **How does your family make an income?**
- **What year did you leave school? Why?**
- **What are your hopes for the future?**

**Findings and Next Steps:** The initial results indicate that, in fact, the children who participate in MindLeaps are representative of Rwandan street children in general. This means that MindLeaps students are representative of the street child population in Rwanda. MindLeaps is currently analyzing the potential for predicting how a street child will progress through the MindLeaps program.

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<sup>2</sup> Children “on the street” are those who are on the street during the day, but return home to sleep at night. Children “of the street” are those who are on the street during the day and also sleep on the street at night.

# Quantitative Data Analysis

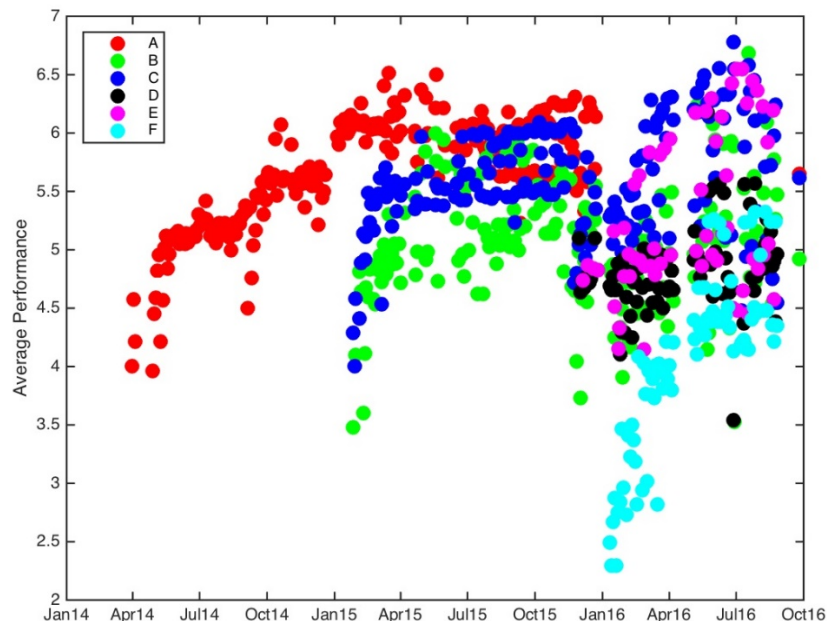
## Research Question

To what extent can MindLeaps predict how well a student will succeed in MindLeaps?

## Methodology

Our ongoing data collection revolves around the maintenance and analysis of the skills progress made by students in the weekday and weekend programs at MindLeaps. MindLeaps is working with Dr. Patrick McSharry, a mathematician from **Oxford University** and visiting professor at Carnegie Mellon Rwanda. Dr. McSharry is currently working with MindLeaps to create an algorithm tracking the progression of students' skills.

**Below is an example of scatterplot results demonstrating the overall achievements of children, both in and out-of-school, who participate in MindLeaps' program:**



- Red = Group A (boys group, out-of-school, began April 2014)
- Green = Group B (boys group, out-of-school, began January 2015)
- Blue = Group C (boys group, out-of-school, began January 2015)
- Black = Group D (boys group, out-of-school, began October 2015)
- Purple = Group E (girls group, in-school, began September 2015)
- Teal = Group F (girls group, out of school, began January 2016)

**Findings:** The correlation of 0.7 quantifies how well MindLeaps can predict the performance for a given student given all the explanatory variables at hand. One of the variables is time in the program, and the model states that this has a statistically significant positive effect on performance.

## NEXT STEPS of MindLeaps Research

As initial results are discussed and contextualized, there are avenues of research that MindLeaps recognizes are important to the organization's growth and mission.

1. Comparing in-school children with out-of-school children in cognitive and non-cognitive development in the MindLeaps' dance program
2. Conducting negative case study analysis for children who are outliers of the program
3. Identifying additional factors that contribute to the success or failure of out-of-school children in the program
  - Conducting a factorial analysis to determine which factors contribute to success or failure
4. Predicting the success of out-of-school children from the MindLeaps program once enrolled in school
5. Comparing cognitive development of children out-of-school in MindLeaps with children in-school using the Panga Muthu Test<sup>3</sup> (PMT) (Kathuria & Serpell, 1988)
6. Comparing cognitive development of children in MindLeaps from their start time, to 3 months, 6 months, 9 months, 1 year using the Panga Muthu Test compared to their cognitive skills scores

## University Involvement

**There are specific ways that MindLeaps envisions a partnership with a university.**

1. Providing students with a semester-long research practicum focused on one of the above research questions
2. Students can provide support through assisting in data collection, data analysis, and/or contributing a comprehensive literature review or annotated bibliography
3. Students will have the opportunity to be co-authors, acknowledged, in any published articles depending on level of involvement in research
4. Students will have the opportunity to co-present at conferences

**MindLeaps will provide a doctoral-level researcher who will provide research oversight during all study participation.**

What a university provides:

1. Competent and involved principal investigator (lead faculty) during any research studies
2. Access to IRB

Possibilities for collaboration:

1. University affiliation
2. Grant writing opportunities
3. Joint research projects
4. Publications



<sup>3</sup> A non-verbal cognitive test developed in Zambia by Dr. Robert Serpell to ensure that children living on the African continent are correctly tested, cognitively.

**References:** Kathuria, R. & Serpell, R. (1998). Standardization of the Panga Munthu Test – a non-verbal cognitive test developed in Zambia. *The Journal of Negro Education*, 67(3), 228-241. Retrieved [https://researchgate.net/profile/Robert\\_Serpell/publication/247637744\\_Standardization\\_of\\_the\\_Panga\\_Muntu\\_test\\_a\\_nonverbal\\_cognitive\\_test\\_developed\\_in\\_Zambia/links/0c960521f69a244584000000.pdf](https://researchgate.net/profile/Robert_Serpell/publication/247637744_Standardization_of_the_Panga_Muntu_test_a_nonverbal_cognitive_test_developed_in_Zambia/links/0c960521f69a244584000000.pdf)