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**Hamburg Numeracy Project – Refugees & Numeracy**

**- School mathematical Background and Numeracy Skills of Refugees**

**Challenges and Lessons Learned for Teachers & Teacher Education**



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# Refugees and Numeracy

- As a part of the Hamburg Numeracy Project
- Research partnership project between UNESCO-UIL, Helmut-Schmidt-University, University for Applied Science & University of Hamburg
- Project studies **Numeracy skills** of **vulnerable groups** such as refugees, handicapped persons etc.

## What is numeracy?

- an individual's capacity to formulate, employ and interpret mathematics in a variety of contexts. It includes reasoning mathematically and using mathematical concepts, procedures, facts and tools to describe, explain and predict phenomena. It assists individuals in recognizing the role that mathematics plays in the world and to make well-founded judgments and decisions needed by constructive, concerned and reflective citizens (OECD 2014, p. 37).

- Gain knowledge about refugee's ***school mathematical background and numeracy skills in order to support them to take full part in German society***
- Results will be used for:
  - Improvement of educational work with refugees, meeting the needs of refugees and considering their learning requirements
  - degradation of stereotypes about refugees and their countries of origin



# Target Groups

- Refugee Students
- Young refugees (age 15-25)

## SubQuestions

- How did students from Ghana, Syria, Iran and Germany perform in the international TIMSS studies (Trends in International Mathematics and Science Study) and what can this reveal about the mathematical competencies/knowledge of refugees from these countries in Germany?
- What is known about their mathematics-specific learning approaches and the underlying educational approaches? What are the consequences for mathematical studies in Germany at the various levels ?
- Are Syrian, Iranian and Ghanaian refugees more used to textbook – based and teacher oriented teaching or can they cope with self-organised and project-oriented work in the field of mathematics, which are more common in German settings?
- Which conclusions can be drawn from these results for vocational education or other adult educational trainings in the field of mathematics, computer science, science, and technology (MINT subjects) that refugee apply for?

# Research design & Methods

- Secondary analysis of data from TIMSS / PISA
  - Analysis of Syria, Ghana, Iran, Germany (Lebanon, Jordan)
- Study with Refugees in educational environments such as Preparation classes for Vocational Trainings for Refugees (AvM-Dual) or Preparation German classes at schools etc.
- Qualitative Research such as interviews and focus-groups with refugees in different educational contexts





# Education, Refugees and TIMSS

## Integration Through Education

- Refugees receive asylum and protection from war in Germany
- They should be able to access society, and be able to participate and shape it
- School is of central importance – it is the bridge to the society of the host country for refugee children, adolescents and parents (Conference of Ministers of Culture, 2015)
- Numeracy is a vital part of **being able to function in work-life** and as an **active citizen**

# Challenges for Schools and Teachers

- School system (was) not prepared to receive high numbers of refugees
- Little knowledge of the needs and competencies, school background, mathematical competencies and numeracy skills of refugees among teachers, stakeholders, etc.
- Language barrier
- Traumatized students and young adults
- Uncertain asylum status
- Many students out of school for several years
- Differences in teaching approaches in country of origin and host country

# Refugees in Hamburg

Table 3: Individuals with a German residence permit for international law, humanitarian or political reasons and their countries of origin (Hamburg)

Country of Origin	Number of people
Syria	9.470
Afghanistan	7.745
Iraq	2.120
Iran	1.798
Eritrea	1.632
Serbia	599
Ghana	556
Russian Federation	535
Turkey	428
Montenegro	309

(Hamburger Senat 2017)

# Situation of Refugee Students in Hamburg

- 7000 students in international preparation classes
- 80 % of the students are from Syria, Iraq and Afghanistan
- 228 Preparation classes
- 1 school psychologist for 16.500 students (Lange, 2016)

# Databasis / Participation in Timss

Table 1: Participation of respective countries in TIMSS 1995 – 2015). (x denotes participation in respective study, (y) denotes school grade) (IEA 2012)

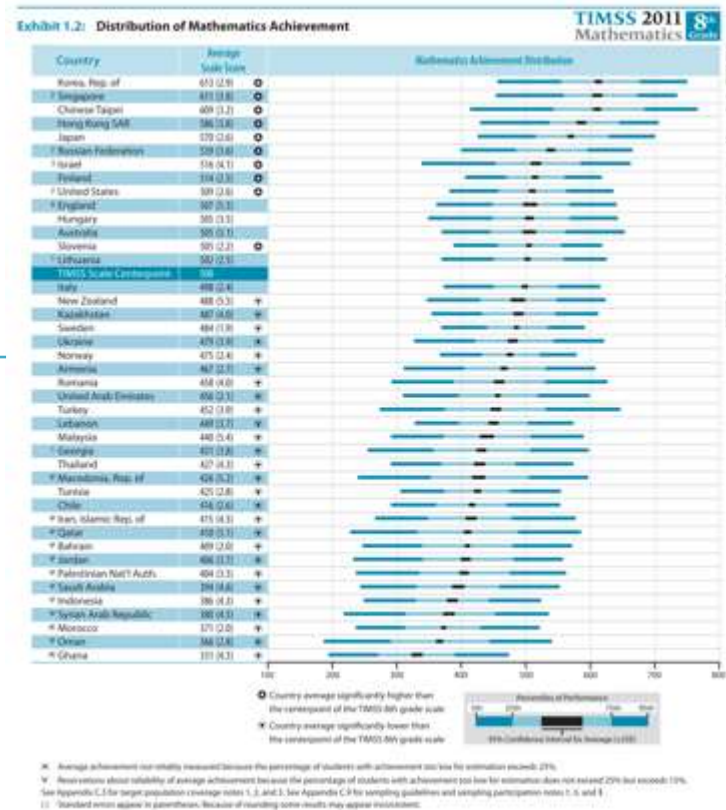
	TIMSS 1995	TIMSS 1999	TIMSS 2003	TIMSS 2007	TIMSS 2011	TIMSS 2015
Germany	x (8)			x (4)	x (4)	x (4)
Austria	X (4 & 8)			X (4)	X (4)	
Syria			(x (8))	x (8)	x (8)	
Ghana			x (8)	x (8)	x (8)	
Jordan		x (8)	x (8)	x (8)	x (8)	x (4 & 8)
Iran	x (4 & 8)	x (8)	x (4 & 8)	x (4 & 8)	x (4 & 8)	x (4 & 8)
Lebanon			x (8)	x (8)	x (8)	x (8)
Palestine			x (8)	x (8)	x (8)	
Botswana			x (8)	x (8)	x (8)	x (8)
Morocco		x (8)	x (4 & 8)	x (4 & 8)	x (4 & 8)	x (4 & 8)
Tunisia		x (8)	x (4 & 8)	x (4 & 8)	x (4 & 8)	

# Distribution of Mathematics achievement at 8th grade

Average and range

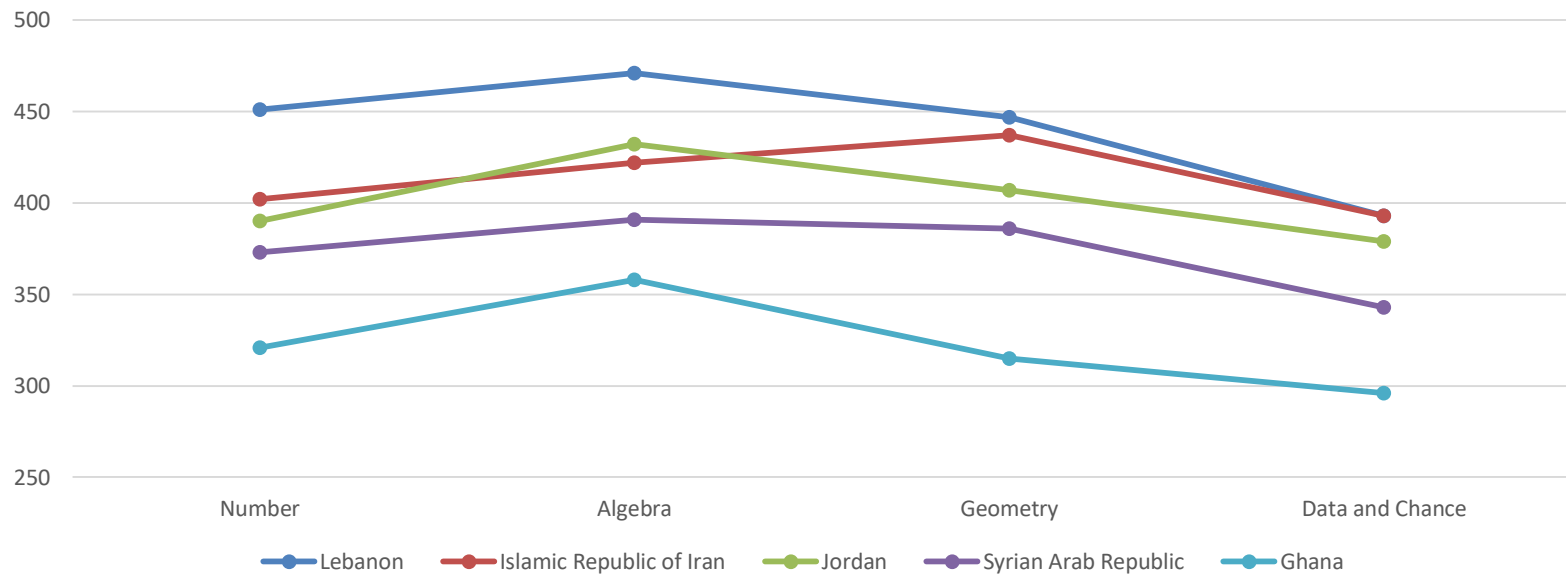
Lebanon	449
Iran	415
Jordan	406
Syria	380
Ghana	331

(IEA 2012, p.5)



# Content Domains

Achievement in Mathematics Content Domains TIMSS 2011 (IEA 2012)



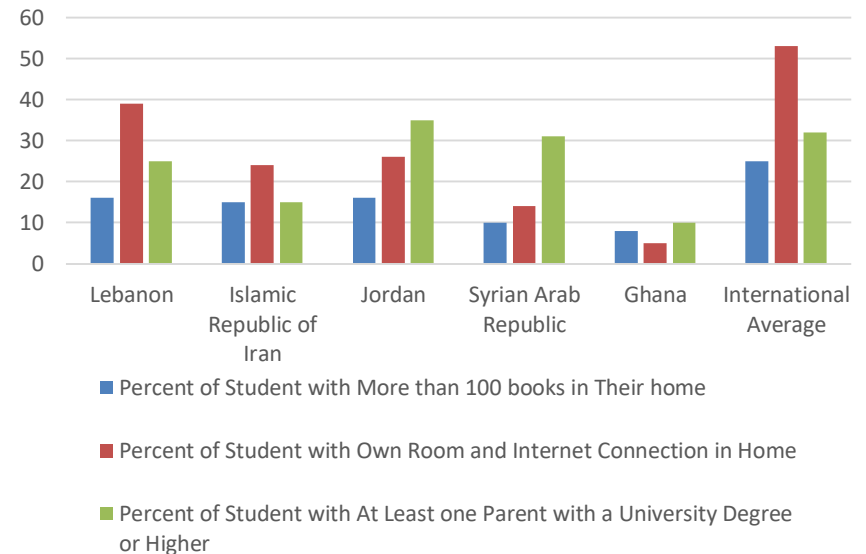


# Home Resources & Language of the Test

Students Speak the Language of the Test at Home (reported by students)

	Always or Almost Always		Sometimes		Never	
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement
<b>Lebanon</b>	20	466	64	446	16	442
Islamic Republic of Iran	64	433	21	383	15	382
Jordan	88	409	9	400	3	363
Syrian Arab Republic	85	383	11	362	4	378
<b>Ghana</b>	26	332	70	334	4	292
International Average	79	469	17	443	4	421

Components of the Home Educational Resources Scale TIMSS 2011 8th Grade (reported by students)



## First findings

TIMSS can reveal knowledge on

- Educational Systems of Refugee's countries of origin and Achievement of Students
- Classroom instructions, home and school resources

→ Cannot reveal knowledge on mathematical competences and numeracy skills of refugees in Germany

# Lessons Learned for Teachers and Teacher Education

- Need of special courses for pre-service and in-service teachers in order:
  - to develop knowledge of the specific ways of doing mathematics in different cultural contexts (e.g. different ways of notation of multiplication, different basic ideas on central mathematical concepts such as fractions)
  - To sensitize them for specific problems in understanding mathematics, not only concerning language, but focused on different notations, basic ideas and so on
  - To overcome wrong beliefs about low interest of refugees from Arabic and African countries in education, especially in Mathematics
  - To develop knowledge of possibilities for special support measures for refugees concerning language, basic ideas, used teaching methods

# Ongoing research Process

- Development of Education Reports for refugee's countries of origin
- Secondary analysis of TIMSS
- Development of a study with refugees in different educational contexts concerning their mathematical background and numeracy skills
- Development of university seminars in M.Ed. with future teachers on „Mathematics & Refugee students“



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# Thanks for the attention!

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