GenAI for Literacy in Low-Resource Settings

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GAIfE: Using GenAI to Improve Literacy in Low-resourced Settings

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Background

Illiteracy is a problem especially in the Global South

- Illiteracy rates are higher in countries with under-resourced languages
- These under-resourced languages lack materials that are suitable for use in teaching
- Lack of teaching materials creates barriers for teaching literacy in local communities especially in Africa
- Materials that do exist may not be understandable

Background

GenAI has great potential but there is heavy bias

- GenAI has bias towards wealthier or more resourced languages and cultures
- The picture shown was an image the researchers tried to generate but had to regenerate to properly represent the Muslim manner of prayer

Research Questions

Question 1

Can a workflow be developed to generate more literary materials for underresourced languages?

Question 2

Can a set of strict criteria be set to ensure the generated material is usable?

Question 3

How well does the generated material help the underresourced language communities?

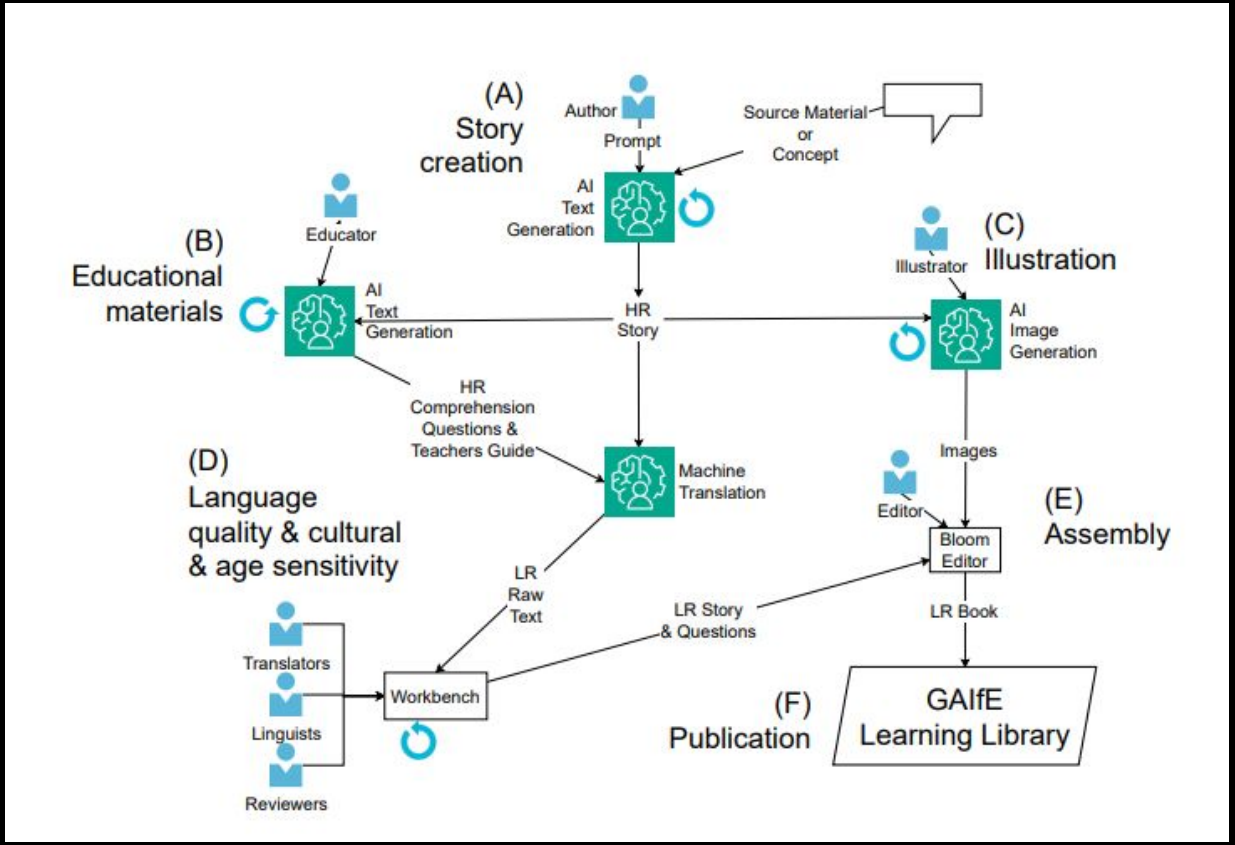
Methodology: Criteria

1. Always present the point of view of the target culture in an authentic and dignified fashion, and avoid content that represents the view from of an outsider, no matter how sympathetic
2. Taken as a whole, the stories must be inclusive from the point of view of sex, ethnic identification, and socio-economic background. Every reader should see themselves represented and validated in at least one of our stories.
3. Names, places, and situations must be familiar to the target readers.
4. Avoid content that is too topical, timely, or centered on current political tropes.
5. When the target audience is children, all care must be taken that content will not harm the children psychologically and will depict their environment in an affirming way that promotes their sense of self-worth.

Methodology: Criteria Contd

5. Continued
    a. Content must be emotionally resonant, entertaining and educational for children in the target culture.
    b. Warmth, love, positivity, and reinforcement of self-esteem should under-gird all content. Challenging content may be presented, but always in a way that promotes personal development and compassion.
    c. Avoid metaphors and imagined and abstract language that can only be understood with the assumption that the child has a background in another culture, particularly in the culture of the former colonizing power
    d. Graded material at different levels should reflect the intellectual development of children at different ages and backgrounds in the target culture. Themes and images must always be age appropriate

Methodology: Workflow



Methodology: Workflow

1. An author uses source material relevant to the local culture and used AI to generate multiple stories in a High resource language. This is passed to educators and illustrators
2. The educators would create learning materials and questions to support the reading. Illustrators would generate relevant images for the books
3. The stories, and learning materials would be translated from the high resource language into a lower resource language and then set for review by a panel judging the quality, cultural and age sensitivity
4. Finally the works that passed would be combined with any illustrations and passed to an editor to be published

Methodology: Testing

- The researchers chose to use Bambara, the language of Mali in West Africa
- They set up reading programs at 3 urban community centers, 2 rural community centers, and 1 school
- The students ranged from 4 to 15 and all were fluent speakers but could not read the language past identifying letters and decoding single words
- 5 of the locations received 3 half day sessions totaling 12 hours
    - The rural community center, Safo, received 8 half day sessions totaling 32 hours due to little to no schooling for the participants

Results

- The researchers and teachers generated 174 illustrated books with 158 in Bambara and 16 written in other national languages, totaling roughly 4000 pages
- Designed for written text and for computers and mobile devices all freely available
- ChatGPT was used by the authors as an accelerator that reduced research time and helped to create abridged stories for children
- The researchers noted that the author had to be included in the initial story generation to ensure that the criteria were met

https://bloomlibrary.org/RobotsMali

Results

Inst. Type - Story Content	Total Inst. Type	Total Story Inst. (%)	Avg. # of Type/Book	Avg. # of Type/Page
Ideation	4	2.4	0.4	0.02
Generation Instruction from Seed	13	7.8	1.3	0.05
Story Shaping	21	12.7	2.1	0.08
Cultural Adaptation	50	30,1	5	0.20
Language Level Adjustment	37	22.3	3.7	0.14
Language Idiom Adjustment	11	6.6	1.1	0.04
Stylistic Improvement	30	18.1	3	0.12

Table 1: The story content prompts' instruction types and statistics

Results

With 475 responses from 300 unique participants, the increase in literacy was recorded as:

- Urban Community Reading Programs: 53%
- Rural Community Reading Programs: 79%
- School-based Reading Program: 70%

It is noted that the researchers acknowledged they did not have enough data collected to remove all possible variables for this experiment

Additionally the parents had markedly different responses to learning the language between urban and rural
Rural had unanimous support (sample size: 15) whereas urban had roughly 25% support for learning Bambara (sample size: 23)

Commentary

- Definitely a decent framework to help other lower resourced languages to build their resources for students
- While the numbers show promise, this would need to be repeated and the data better collected to show how well this process truly works especially at larger scales
- One drawback is the need for a number of people to be able to read the language and read a higher resource language

Quiz

Question 1

What were the criteria used to judge stories generated by AI?

A . Loosely crafted set of standards that were not always applied

B. A general set of guidelines about culture that were not entirely followed

C. A strict set of guidelines that were adhered to by the authors to represent the local cultures

D. A set of guidelines that encouraged external cultural views in the stories

Question 2

What language was chosen to be used to expand the literacy of the speakers?

A . Tayap in Papua New Guinea

B. Bambara in Mali

C. Fula in Mali

D. Lingala in Democratic Republic of the Congo

Question 3

The researchers were able to use the GenAI models without much input to write the stories.

A. True

B. False

Question 4

What was a major hurdle noted by researchers?

A . The models were often eurocentric and required heavy editing and input

B. They generated too many stories to be reviewed

C. None of the models were able to help with any of the steps

D. The generation was done in the low resource languages