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Production of DAISY standard accessible reading materials for the students with print disability of grade 1-10 of Bangladesh

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Abstract:

According to the findings of WHO and Bangladesh Bureau of Statistics (BBS, 2011), approximately four million people are visually impaired in Bangladesh. Furthermore, approximately 27% (UNESCO UIS, 2017) of people in Bangladesh are illiterate or low literate who are considered as print disable. Accessible information and reading materials have not been available to this group. However, the government and non-government/private organizations provide a range of school services and inclusive education programs for blind and partially sighted students. Although some of the organizations are using audio-books as a supplementary education materials, but there were no accessible reading materials for the students with visual impairments. Considering the situation, YPSA, along with Access to Information program (a2i), Prime Minister's Office by the technical support of WIPO, Accessible Books Consortium, DAISY consortium and GAATES has produced DAISY digital multimedia books, Accessible E-books, Digital Braille Books for the student of grade 1 to 10 which are much accessible and cost effective than the regular paper books for the students with visual disabilities, print disabilities and learning disabilities. The project converted all the text books into DAISY multimedia format, which can be converted further into DAISY full text full audio text books, Braille and accessible e-books from

the source DAISY files. The digital text books are accessible for all including the students with visual disabilities, print disabilities and learning disabilities.

The Honorable Prime Minister of Bangladesh formally launched the initiative and distributed the books among the students with visual impairments. Now all learners can get free, equitable and quality primary and secondary education leading to relevant and effective learning outcomes (SDG Target 4.1). Also, education facilities became child, disability and gender sensitive and provide safe, inclusive and effective learning environments for all (SDG Target 4.a) towards quality education. The DAISY multimedia books have opened new avenues for the students to harness the accessible educational resources for learning. It can certainly improve the level of competency of the students with visual impairments, remove them from being information dark, and make them ready to work as human resources.

Keywords: Visually impaired, Accessibility, Inclusive Learning, Information rights, DAISY.

Introduction:

According to WHO, visual functions can be classified into four categories e.g., Normal Vision, Moderate Visual Impairment, Severe Visual Impairment and Blindness. There are 248 million people with visual impairments living in the world. Among them, 39 million are blind and 245 have low vision. About 90 percent of visually impaired people are residing in the developing countries; around 65 percent of them are over 50 years old. It has been estimated that around 19 million children under 15 years are visually impaired [1].

According to World Health Organization (WHO), among the persons with disabilities (PWDs) in Bangladesh, around fifty percent are visually impaired. Prevalence of disability is 19.6 percent among the working age (18-65) [2]. Among the PWDs, 20.7 percent are at primary school-going age (5-14) [3]. In addition to different physical disabilities, Bangladesh is struggling with rampant illiteracy. The literacy rate is 48% (54% for male and 41.4% for female) which also requires an alternative education method rather than that of the conventional one [4]. These issues hinder the efficiency of the existing massive human recourse in Bangladesh, and eventually increases unemployment and underemployment [5]. As almost 48 in 100 people are illiterate or low literate, they are considered as “Print Disable” and need assistance while reading and writing. Accessible information and reading materials has not been available to this group.

To resolve the problems of the students with visual impairments, the government of Bangladesh has taken several steps to transform the textbooks to DAISY multimedia books. The process has involved YPSA for the production, Department of Social Services (DSS) as the implementing partner and NTCB for the permission of such transformation.

Problems faced by the Students with Visual Impairments:

In Bangladesh children with disabilities have clearly been among the most marginalized when it comes to education. It was reported in 2011 that out of an estimated 421,734 children with disabilities are in the primary school age group [3]. A major 2002 study found that, of an estimated 1.6 million children with disabilities of primary school age, only 4 per cent had access to education nationwide. In areas where there were disability-related activities 18 per cent had access. Of this group 48% were enrolled in formal education, 23% in privately run integrated schools, 15% in special education, 5% in inclusive education and 9% in other types of education.[6] However, the students with visual impairments are facing the following problems while continuing their studies:

- The Department of Social Services (DSS) is responsible for the education services for the students with visual impairments. The department manages special schools, provides teachers’ training, enroll students, and produce braille textbooks for the students with visual impairments.

Due to some limitations in administrative processes, it takes three to four months to publish braille books. Therefore, the students cannot get the recent edition of their textbooks at the beginning of their academic year.

- As part of the inclusive education policy, many of the students with visual impairments are studying in conventional schools. But, due to lack of training for the teachers and use of ICTs in education, both the teachers and the students cannot communicate properly to understand their lessons.
- Since the teachers are not properly oriented on 'how to teach the students with special needs', they cannot teach the students with visual impairments in an efficient manner.
- The students also need help from their family and friends to prepare recorded lessons so that they can use those records during their studies.
- Due to lack of supplementary education materials and teacher's training, the students with visual impairments are not encouraged to take science and mathematics.

What is Daisy?

DAISY (Digital Accessible Information System) is a technical standard for digital audiobooks, periodicals, and computerized text. DAISY is designed to be a complete audio substitute for print material and is specifically designed for use by people with "print disabilities", including blindness, impaired vision, and dyslexia. Based on the MP3 and XML formats, the DAISY format has advanced features in addition to those of a traditional audio book. Users can search, place bookmarks, precisely navigate line by line, and regulate the speaking speed without distortion. DAISY also provides aurally accessible tables, references, and additional information. As a result, DAISY allows visually impaired listeners to navigate something as complex as an encyclopedia or textbook, otherwise impossible using conventional audio recordings. DAISY multimedia can be a book, magazine, newspaper, journal, computerized text, or a synchronized presentation of text and audio. It provides up to six embedded "navigation levels" for content, including embedded objects such as images, graphics, and MathML. In the DAISY standard, navigation is enabled within a sequential and hierarchical structure consisting of (marked-up) text synchronized with audio. [9]

Access to Information Programme, Young Power in Social Action and Government:

As a voluntary, nonprofit, social development organization Young Power in Social Action (YPSA) has long been working with the poor and vulnerable population, particularly person with disabilities. YPSA partnered with DAISY consortium since 2005 and gathered experiences in producing and distributing DAISY Digital talking books to over 500 individual members and 20 organizational members.

The Access to Information Programme under the Prime Minister's office has been instrumental in leveraging ICTs in education to enhance the quality of teaching-learning interactions. To achieve the goal of building 21st century citizen, the government has also implemented Multimedia classrooms in more than 50,000 primary and secondary schools and Madrasas in the country. In 2013, the Access to Information Programme has launched the Service Innovation Fund (SIF). The objective of the fund is:

- (a.) To provide seed funding to pioneering and creative innovations for better public service delivery, and
- (b.) To enhance capacity of small-medium initiatives working to find creative solutions in technology for development.

In response to the 'Call for Proposals', YPSA came up with the idea of producing DAISY contents for the people with disabilities. After a systemic review by the Technical Evaluation Panel, a group of experts who review SIF proposals, the proposal has been revised and YPSA was asked to produce accessible reading text books in the form of DAISY multimedia books for the visually impaired students of primary schools.

During the production of the books, the Access to Information Programme has partnered with the National Curriculum and Textbook Board (NCTB) and DSS to ensure that updated books are being converted and distributed among the students with visual impairments. On 1st January 2014, the Honorable Prime Minister of Bangladesh formally launched the initiative and distributed the books among the students with visual impairments. That is how, this intervention which is first of its kind in Bangladesh, has transformed the educational experience of students with visual, print and learning disabilities; made primary, secondary education inclusive (SDG 4.a); accessible for all girls and boys (SDG 4.1); contributed to improve literacy and numeracy among the user groups (SDG 4.6). Today, around 150,000 students with visual, print and learning disabilities can read and listen to their textbooks. What is more, now all learners can get free, equitable and quality primary and secondary education leading to relevant and effective learning outcomes (SDG Target 4.1). Also, education facilities became child, disability and gender sensitive and provide safe, non-violent, inclusive and effective learning environments for all (SDG Target 4.a).

Production of DAISY Multimedia Books by the persons with visual impairments:

The DAISY multimedia books are produced by YPSA as it has introduced DAISY in Bangladesh, and one of its employees work as the focal person for DAISY in Bangladesh. In the production team, 80% Project staffs were PWDs (Persons with Disabilities) and 2 of the 8 project staffs were Women with Disability. The program manager, who is also the focal person for DAISY in Bangladesh, is also a visually impaired person. In preparing the project, planning meetings were held with Disabled People's Organization (DPO) groups, and student with disabilities to get their suggestions. The persons with disabilities were involved with a participatory process to identify problems, required books and formats. The DPO members, teachers of the Govt. school for the blind, worked hard to interact with the target group, collecting their feedbacks upon which the project has been designed. The PWDs were not only involved in the planning phase but also involved in every phase of the implementation stage such as production and dissemination of accessible reading materials, promoting the use of National E-Content Repository, use of Digital Braille by the Braille press and implementation, monitoring and evaluation of the project etc. It can easily be said that this project is designed by the Persons with Disability for the Persons with Disability.

Use of DAISY Multimedia Books by the teachers:

The Access to Information Programme and DSS has arranged several training programs for the teachers who are responsible to teach the students with visual impairments. During the sessions, the teachers have expressed the potential of DAISY multimedia books in changing the lives of the students with visual impairments. The teachers have also expressed that, this tool can also be used in inclusive education so that all the children can get the benefits of such technology.

Use of DAISY Multimedia Books by the students:

Several orientation sessions have been arranged for the students with visual impairments. The initiative was much appreciated by the students. The students expressed that, this system has eased their lessons. With the introduction of DAISY books, the students are now able to access their textbooks at the beginning of their academic calendar. It has tremendously reduced their dependency to others; they do not need the recorded lessons anymore. They can also operate the books and study on their own. It is expected that the system will encourage the students to study technical subjects e.g., science and mathematics. It is also expected that, with the effective use of this system, the students will be able to increase their level of competencies in the long run.

Case study of a DAISY user - Rafi can now read on his own:

Saifuddin Rafi, one of the four million visually impaired people in Bangladesh, is studying in grade XI at Patiya Government College in Chittagong. His study started in a specialized school (Government

Muradpur School for the Blind) in Chittagong. But, after completing primary level, he got admitted into 'Union Krishi School and College' in Patiya nearby his home town. During his secondary education level, in this mainstream school, he did not get textbooks in Braille or accessible audio format. He had to traverse jumpy situations due to absence of accessible study materials. These difficulties required support from his sister, also a student with her own burden, who assisted him by recording all the books and class notes. The sufferings of his parents were also countless. A child with visual impairment needs extra privileges for continuing education; but the access to study materials required and their affordability is perplexing. Therefore, parents wishing their children to continue their studies face physical, mental and financial stresses. [10]

For Rafi, difficulties to get accessible study materials needed for visually impaired students was a major challenge, and it troubled him and his family till class VIII. While studying in class IX, he received textbooks in audio format. Later he came to know that these were called DAISY-standard digital talking books. The digital talking books are accessible materials which provide the text in an audio version for all including students with print and learning disabilities. Digital talking books are for everyone who needs accessible information; readers can play the audio and simultaneously display and highlight the corresponding text. It eases the education for the number of visually impaired students in Bangladesh like Rafi. These accessible and affordable reading materials brought a momentous shift in Rafi's learning curve. Through receiving Grade Point Average (GPA) 5, the highest grade obtainable for secondary and higher secondary education system in Bangladesh, in his Secondary School Certificate (SSC) examination, Rafi has created an example for other visually impaired students who are struggling for their study fighting against their disabilities. [10]

Evaluation by the Bangladesh Institute of Development Studies:

In 2014-2015, the initiative has been evaluated by the Bangladesh Institute of Development Studies. According to the study report, 'The digital talking books are now available online. These books have also been distributed through CDs to the students with disabilities and to other institutions. There is no doubt that this model will work well for Bangladesh. The project can be stated as a best practice model for enabling the print disable people to undertake their formal studies without facing any difficulties for text-books. Not only the students with disabilities, but also the students with normal vision can find these books useful to read, practice appropriate pronunciation and exercise home-works. The initiative undertaken by A2I program is praiseworthy, which will enable to minimize digital-divide and bring a large section of disabled population into mainstream development initiatives in the long run' [7].

Challenges faced:

1. Lack of high quality text to speech software in Bangla language: YPSA has used the 'Human Narration' for full text full audio Daisy multimedia books.
2. Lack of Unicode text: All the texts of the NCTB books have been converted to Unicode text.
3. Absence of related copyright laws in the country: The Access to Information Programme was instrumental to get the permission with Govt. and publishers to make the accessible books.
4. Lack of established library service for distribution of accessible reading materials: All the books are uploaded in alternative format such as e-book, Daisy multimedia books, digital Braille books and Unicode text in online portal for wider distribution.
5. Lack of awareness on digital contents. Lack of motivation of the teachers to use the DAISY Books: Separate sessions are being organized for the teachers to increase their level of motivation.

Current Status of the initiative:

With the successful completion of the 33 primary school textbooks, the Access to Information Programme has awarded YPSA to produce all the 72 text books of the secondary schools. Every year, all the students with visual impairments in Bangladesh receive DAISY multimedia books. It is expected that, this pedagogical improvement will increase their level of terminal competencies at the end of the

year. A Randomized Controlled Trial (RCT) is being conducted by the Institute of Education Research of Dhaka University to measure the effectiveness of this initiative.

National and International Recognitions:

This project has won multiple awards and recognitions for developing these multimedia talking books in national and international arena in individual and organizational category, for the expansion of the accessibility of digital publications with innovative models and practices. The most remarkable awards are given below:

Year	Award/Recognition	Link
2018-19	UNESCO Prize for Digital Empowerment of Persons with Disabilities (2018/2019)	https://en.unesco.org/news/laureates-bangladesh-and-china-receive-unescoemir-jaber-al-ahmad-al-jaber-al-sabah-prize
2017	World Summit on the Information Society (WSIS) Prize	https://blog.apnic.net/2017/08/31/apnic-42-fellow-wins-prestigious-wsis-award-work-visually-impaired/
2017	Henry Viscardi Achievement Award, USA.	http://ypsa.org/2017/12/as-a-first-bangladeshi-vashkar-bhattacharjee-received-2017-henry-viscardi-achievement-award-in-new-york/
2016	Innovation of policies and practices 2016 by zero project	http://ypsa.org/2016/02/bangladesh-experiences-presented-at-zero-project-conference-2016/
2016	Bangladesh's Prime Minister Award	http://ypsa.org/2016/12/vashkar-awarded-by-prime-minister-sheikh-hasina/
2015	Accessible Books Consortium Award for Accessible Publishing Initiative at the International Excellence Award 2015 held in London Book Fair	http://www.daisy.org/news-detail/1422
2015	Service Innovation Fund (SIF) Award 2015	http://ypsa.org/2015/02/3rd-round-of-service-innovation-fund-sif-awarded-to-ypsa/
2014	ISIF Asia Award	https://isif.asia/2014/12/
2013	Innovation Grant by access to Information program (a2i) of the Prime Minister Office for DAISY book Production in 2013	http://www.daisy.org/planet-2013-09#a5
2010	National e-Content and ICT4D champion Award 2010 for DAISY For All in Social Inclusion and participation categories	http://ypsa.org/2010/08/daisy-for-all-and-ship-breaking-in-bangladesh-web-portal-received-national-ict4d-award/
2010	Manthan Award South Asia, awarded for DAISY for All in Bangladesh in the e-inclusion category	http://manthanaward.org/e-inclusion-2010/

Sustainability

The ownership of NCTB ensures that whenever there is any modification to the national curriculum that will be integrated in the accessible reading materials thus ensuring availability of updated content to the print disabled population.

Thanks to the use of open source technology, the process of developing and producing the full-text and full-audio multimedia books, Braille books accessible e-books etc. through the use of DAISY is easily replicable.

But to attain maximum leverage from this innovation, it is necessary to continuously come up with innovations that complement the overall learning environment for the print disabled population. In this regards, a2i's iLab can play a vital role as an initiator and incubator of innovative solutions. Already an initiative is being undertaken to develop a local, low-cost version for DAISY player. The future of this initiative lies in making it independent of hardware type and user-friendly for users of any level of education.

Partnerships

The copyright ownership for this project on the accessible reading materials developed for the print disabled persons lies with a2i and Young Power in Social Action (YPSA). a2i would continue to bring about innovation to solve daily challenges faced by PWDs, while YPSA would continue to be involved in activities to do with social and economic empowerment of PWDs.

The Department of Social Services (DSS) within the Ministry of Social Welfare (MoSW) has been involved from the very onset of this project since the department is mandated to serve the interests of PWDs. They will procure and distribute the materials among users within the scope of different government projects.

Over time, NCTB has emerged as the key technical partner to this initiative since they have taken complete responsibility of updating contents and distributing the materials to school going children.

In the international arena, the initiative is already receiving technical and advisory support from the DAISY Consortium, the Accessible Books Consortium, WIPO (providing copyright of accessible reading materials and allowing international exchange of books) and GAATES.

Conclusion:

With the aim to build the nation ready to contribute in the 21st century workforce, the government of Bangladesh introduced ICT in education in the overall education system. The students with visual impairments has immense potential to get the best out it and turn into human resource. The DAISY multimedia books have opened new avenues for the students to harness the resources and learn. This initiative has proven to be an effective solution by ensuring accessible reading materials for the students with disabilities and thereby reduce the 'digital divide'. Therefore, DAISY multimedia books can certainly improve the level of competency of the students with visual impairments, remove them from being information dark, make them ready to work as human resources and thus set a positive example for the global south.

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