

# Open Licensed AAC in a Collaborative Ecosystem

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**Abstract.** A collaborative ecosystem that encompasses the use of open-licensed augmentative and alternative communication (AAC) solutions and systems has the potential to provide positive outcomes for children with severe speech and language difficulties. This has been shown through a project that highlighted the willingness to provide a considerable amount of teamwork and participation of families and carers involving 124 children with complex communication needs across three Eastern European countries. Participation was based around a UNICEF hub in each capital city. The hub provided support for small groups of AAC experts sharing their knowledge with limited resources and widely varying groups of other professionals, families and carers of potential AAC users. Initial face to face training sessions provided introductory sessions to open licensed AAC solutions and systems. These sessions were backed up by ‘any-time’ access to an open licensed eLearning platform containing freely adaptable interactive AAC online training resources to be translated into modules by participants in each country. The level of content was based on the first three levels of the European Qualifications Framework. There followed the development of pictographic symbol sets to enhance the localization of already available sets suitable for children. Cultural, linguistic, and social settings were catered for within an open-source communication app. Feedback and formal evaluations provided by parents, carers and professionals showed that the benefits to the children were not just in AAC use, but also in their social competency levels, self-esteem and adaptability.

**Keywords:** open license, AAC, Augmentative and Alternative Communication, disability, symbols, assistive technology, participatory. PIADS.

## 1 Introduction

Open licensed Augmentative and Alternative Communication solutions and systems for those with complex speech and language difficulties, have the potential to support interventions where collaboration with localization occurs. The nature of open-licensed technologies and content also expands the options available to those living in areas where support for AAC is limited and acquiring suitable technologies can be costly [1]. However, at the time of writing, gaps still remain in the market, such as a lack of easily developed open licensed speech synthesis for text to speech in minority languages and not all multilingual AAC apps are available for Android tablets. Despite these barriers, open licenses can offer the chance to ensure that any choices

made and decisions taken, can respect local languages, cultures, religions and social settings, because opportunities for local adaptations can be embraced with a degree of flexibility.

The collaborative model chosen for this project included ‘person-focused learning’ where colleagues already knowledgeable about AAC supported those wishing to learn more about AAC “to work directly with family members and individuals with disabilities in collaborative teams, using augmentative and alternative communication systems” [2]. The amount of international engagement within the model depends on the requirements gathered by local teams. As several countries were coming together to support AAC within a larger region, under the auspices of the United Nations Children’s Fund (UNICEF), the model needed to be sustainable and scalable. Even at the outset, it was hoped that more countries would implement the collaborative ecosystem concept independently of the original project.

The initial scope of the project included plans to create additional AAC symbol sets to support local languages and culture, to be used alongside a more extensive previously developed open-licensed AAC pictographic symbol set. There was the provision of Android tablets with an open-source AAC app that would automatically link to the newly created symbol sets, as well as other open licensed symbol sets and newly created voices for text to speech in the relevant languages. Open licensed online and face to face training resources were developed with various feedback systems put in place for evaluation purposes.

There was a commitment to sharing knowledge throughout the process, with an understanding that any time constraints and cost implications to participants would be carefully monitored by local UNICEF teams. Finding solutions and systems for complex technical problems, such as the development of the AAC app and speech synthesis were contracted out to independent companies. The website hosting the multilingual repository of symbols and open-licensed learning platform was open to all those registering on the system. This not only allowed authors to create surveys for voting on the new symbols but also for the development of paper-based communication boards and personalized images or symbols with additional elements to denote concepts such as tense or number.

## **2 Methodology**

Action research could best be described as the way the study was undertaken as it had at its core the aim of being able “to contribute both to the practical concerns of people in an immediate problematic situation and to the goals of social science by joint collaboration within a mutually acceptable ethical framework” [3]. However, as many local participants became involved in the project and co-created the gathering of data, shared knowledge and outcomes, the actual method used over the eighteen months would better be described as Participatory Action Research (PAR) where “communi-

ties of inquiry and action evolve and address questions and issues that are significant for those who participate as co-researchers" [4].

An implementation plan was collaboratively developed with UNICEF and experts in each country with a series of work packages or eight main steps that were designed to overlap or run concurrently depending on local situations:

1. scoping the project and finding potential stakeholders,
2. making symbol choices for complex communication needs,
3. capacity development of professionals,
4. symbol design and building with the development of localised symbol sets).
5. introduction to technical AAC devices depending on requirements and
6. the adaptation and deployment of applications to potential users
7. support for families and carers
8. development of resources

Due to the geographical distances between the three participating Eastern European countries (Croatia, Montenegro and Serbia), all those involved in the project used online methods of communication and ethics procedures were dealt with by the individual countries. A series of interactive virtual training modules were developed to back up an initial three short face to face training days. Those involved included collaborators from a university department or a government representative from each country, teachers and therapists as well as family members or carers of potential AAC users. Each country also had a UNICEF office as the hub and 50 participants took part in the face to face meetings in Croatia and Serbia. Throughout the 18-month project strategies were developed and written up as blogs, short notes on social media, presentation slides, videos with AAC users, plus instructions for use of the CBoard<sup>1</sup> communication app and Android tablets. The addition and creation of new symbols involved voting for acceptance by all those supporting AAC users in each of the countries. The training package modules were created with support from both experts in AAC and translators. Those critiquing the end result included experts in AAC as well as local team participants, UNICEF and those working with potential AAC users. Social media and email groups were used for dissemination purposes and AAC forums grew up around the project in the various languages.

Online analytics were set up to judge the amount of interest in the project, because much of the development of communication boards and symbols occurred via the symbol repository site. Usage statistics plus downloads and registration for the training package were designed to provide quantitative data as part of the evaluation process.

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<sup>1</sup> <https://www.cboard.io/>

A series of app development phases were planned with localised speech synthesis for Android devices. Across the three countries over 124 children (under 10 years of age cognitively) took part in the project and were supplied with the AAC systems. Their speech and language disabilities were mainly co-occurring with cognitive and physical difficulties such as cerebral palsy, autism, Downs Syndrome and sensory impairments. A wide range of professionals from teachers, therapists and psychologists supported the children living in urban and country areas. The Psychosocial Impact of Assistive Devices Scale (PIADS) was used to evaluate progress at three-monthly intervals. This scale was translated and had already been validated in several languages for use with children [5] making it a suitable tool to provide standardized user results across the three countries.

### **3 Findings and Discussion**

The impact of the initial project resulted in the development of three new symbol sets in Croatian and Serbian (also used in Montenegro), with the latter in both Latin and Cyrillic script. The process of voting on symbols, uploading and making symbol sets public was found to be much easier to demonstrate in face to face training, rather than via the email queries or further adaptations to the online instructions and short videos. The additions occurred with subsequent symbol set developments, where there had been no face to face demonstrations. It is proposed that the development of a knowledge base using queries and feedback received during the lifetime of the project and beyond, would further help with time management. Three more symbol sets in Urdu, Bulgarian and Turkish have since been uploaded with many of the initial issues having been resolved with another project having translated symbols into Greek. From a low base of 500 users two years ago the symbol repository site had over 8000 28-day active users from across the world by the beginning of 2022.

After the initial trials with the three countries, the AAC training modules, originally based on themes for AAC, were adapted to fit the European Qualifications Framework (EQF) first three skill levels and re-created with four additional translations. At times the sharing of technological skills was essential, as content authors/translators often had differing digital skill levels. Nevertheless, because Moodle was chosen as the open-licensed elearning platform, there were numerous resources and forums available when issues arose. At the beginning of 2022, 663 users had registered and two more translations were in progress. Those countries that took part in the translations have since been maintaining their own learning resources and when issues have arisen there has been good communication to ensure materials and links are kept up to date across the site.

The impact of the Cboard app with the localized symbol sets downloaded, via a Global Symbols application programming interface onto the Android tablets was overwhelmingly positive despite the impact of the COVID-19 pandemic. The latter occurred towards the end of the project, when traditional methods for exploring the

experiences of parents and experts supporting the children, such as interviews and focus groups, were impossible. The amount of Cboard use was explored through the app's analytics, although this aspect of the program had not been fully developed at the time. Across the 124 children, positive progress was also reported in all but one case via an online version of the PIADS. There were 328 entries carried out by both professionals and parents or carers, so that the majority of children had 2 assessments and some had three. The subscales for competency, self-esteem and adaptability showed a high degree of achievement, reflecting the way all those involved in the project had broken down potential barriers to the use of AAC, as well as enabling the integration of the app and other AAC resources within both home and school settings. The overall survey results (Figure 1) reflect progress made by the children six months after intervention, where around 50% had never used any form of Assistive Technology or AAC prior to the project.

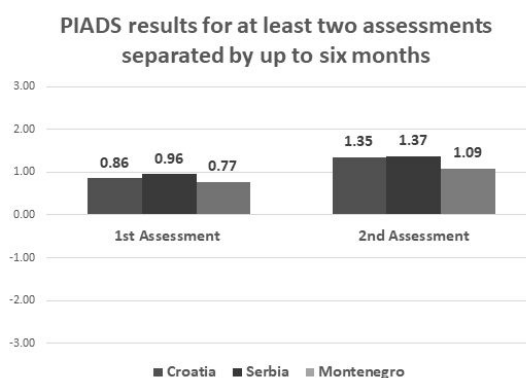


Figure 1. "Individuals given a score of +1 or higher are more likely to continue to use their device" (Jutai, 2020 email message)

## 4 Conclusion and Future Recommendations

Making use of open licensed AAC in a collaborative ecosystem has the potential to offer positive outcomes when supporting children with complex communication needs. It is not often that one has the size and scale of the cohort of participants gathered together in this UNICEF project and further evaluations of the results still need to be validated and interrogated. However, it is possible that the cost-effectiveness and method of delivery could become part of a more detailed implementation plan for future open-licensed AAC projects.

Despite the major limitation to the study being the amount of face to face collaboration that was cut short with AAC users and between all the stakeholders including families and carers, due to the COVID-19 pandemic, many experts have remained directly involved with AAC user' participating teams. The collaboration has also

stretched beyond the original three countries into North Macedonia, Bulgaria and Albania, that are now following through the steps discussed.

Nevertheless, there remains the need to ensure early intervention occurs for those groups of disabled children who may be hard to reach due to socio-economic and geographical isolation. Increased levels of training remain necessary in order to provide cost-effective AAC solutions and systems so that children can “develop sufficient skills to meet the functional communicative demands within real-world interactions with various partners in their natural environment. Communication is not an end goal in and of itself; rather, it is a tool to allow individuals to participate effectively and attain their goals at home, at school, at work, or in the community” [6].

This project provided training, technologies and support using open licensed AAC devices, apps and resources, that with the collaboration of those involved, resulted in increased levels of competency, self-esteem and adaptability (as part of a toolkit of skills) for a small group of AAC users. It is hoped that what has been achieved will have given participating children and others an increased chance of developing enhanced functional communication skills for social and academic inclusion, with continuing capacity building occurring in all the countries and beyond.

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