

WIP: Fostering Community Integration Through Family Creative Coding

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Abstract - This research WIP paper describes the pilot of an informal learning initiative designed to support Ukrainian refugee families in rural Ireland through family creative coding clubs. Following Russia's invasion, approximately 112,000 Ukrainian refugees arrived in Ireland by 2025, with 75% being women and children, and were predominantly settled in rural areas. These demographics face unique integration challenges, including limited access to digital learning opportunities. A Mixed-Methods methodology was used to explore whether a family creative coding initiative could address both computing skills development and social integration needs. Data were collected from local stakeholders and ten Ukrainian families across two rural locations through questionnaires, observations, and focus groups. Findings revealed strong engagement, with parents supporting their children while also developing their own interest in coding. The co-facilitation model effectively addressed language barriers, though technical terminology presented challenges. Stakeholders identified practical implementation barriers but provided actionable recommendations including local recruitment partnerships, bilingual promotional materials, and cultural adaptations. The initiative's family-centered approach circumvented childcare barriers while creating opportunities for intergenerational learning. This research contributes to understanding digital learning as a social practice embedded in cultural contexts, suggesting that family computing initiatives can simultaneously build technical skills, foster relationships, and create pathways for integration in refugee populations.

Keywords— *Informal Learning, Inclusivity, K12, Nontraditional students, Race/Ethnicity, learning communities*

I. INTRODUCTION

Between early 2022 and February 2025, approximately 112,000 Ukrainian refugees arrived in Ireland due to the ongoing conflict in Ukraine. Among them, a substantial proportion, about 75%, were women and children, with 29% of the displaced population under the age of 14 [1]. These demographic trends set the Ukrainian refugee population apart from other refugee groups, particularly when considering integration policies and access to services and employment.

The Irish government has prioritized the integration of Ukrainian refugees, including their participation in a digital society and evolving labor market. However, as of 2025, challenges to this remain, particularly with regard to the

affordability and accessibility of childcare and housing. For women with dependent children, childcare is a major issue as, despite recent expansion of publicly funded programs, childcare remains expensive and in short supply [2]. In addition, due to a national housing crisis, which is particularly acute in urban centres, refugees have been disproportionately hosted in rural areas [1]. Their geographic dispersal presents an additional barrier to access to learning opportunities and social services with the urban-rural digital divide particularly affecting the delivery of STEM education and services [3], [4], [5]. Rural areas often face difficulties in retaining or developing community infrastructure, and may encounter barriers such as limited broadband access, socio-economic disadvantage, and a shortage of STEM resources [6], [7]. These challenges are particularly acute for displaced populations, where the need for tailored educational interventions is critical for social integration and the acquisition of skills for future employment. This paper reports on ongoing research into whether family creative coding clubs could play a role in overcoming these barriers by offering an inclusive, accessible form of learning.

II. RESEARCH AIM AND QUESTIONS:

This research aims to contribute to the development of informal interventions that support computing education among displaced populations. Research indicates that active inclusion measures are necessary to support the integration of refugees, including computing education initiatives. Given the demographic profile of the displaced Ukrainian population, with a high percentage of women and children, there is an urgent need for community-based initiatives that foster both computing skills and social integration. The research questions addressed here are concerned with the exploratory phase of the project and ask whether a family computing education initiative has the potential to address this need:

- What is the level of *interest and engagement* among Ukrainian families in the Program?
 - What are potential *barriers* to the success of the Program?
 - How should the Program be adapted to meet the *cultural and linguistic needs* of Ukrainian families?
 - Does the Program have potential to foster *integration*?
- Future research will evaluate the impact of participation on computing attitudes and behaviors, as well as its role in promoting integration.

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III. FAMILY CREATIVE CODING

Family learning initiatives have been shown to have positive effects on both educational outcomes and social integration for marginalized populations [8]. While the initial motivation of parents may be an interest in their child's learning, such initiatives have also been shown to be an effective route for adults to return to education or training [9], [10]. Additionally, family learning can foster social connections, providing opportunities for families to interact with both their own community members and the host society, allowing them to feel part of the wider social fabric.[11].

The intervention investigated here is targeted at families of children aged 5-13, and builds on an existing successful initiative, OurKidsCode, which supports the development of family-led creative coding clubs within the wider community across rural Ireland with the aim of improving the computing skills of parents and children and increasing parental involvement in computing education[12], [13]. Its programs are based on social constructivist principles, arguing that learning occurs most effectively when situated in meaningful contexts and when learners actively participate in the process of knowledge creation [14]. The idea that learning is a social and cultural process, and that social interaction is crucial to its outcomes, underpins the initiative with its emphasis on both inter- and intra- family collaboration. Each workshop involves creative coding and making activities and participants work together on projects, exchange ideas, and collaboratively solve problems. This also draws on Papert's theory of Constructionism where learners actively create, interpret, and reorganize knowledge in a particularly effective manner through the construction of meaningful tangible artefacts [15]. Sharing outcomes and reflecting on learning are built into the model and scaffolding is used to support families as they gradually take ownership of the learning process, with the goal of fostering independence by the end of the Program [16].

This premise that interventions should create opportunities to experience computing as a family and look to engender confidence, creativity and further self-sustained computing activity was informed by relevant literature, theory, and practice from other contexts [17]. These include Rogoff's research into the importance of 'learning communities' [18] and Gonzales et al.'s influential concept of 'funds of knowledge' which presupposes that "people are competent", recognizes their existing expertise, and builds on skills and competencies that they already possess [19].

IV. RESEARCH METHODOLOGY:

This research forms part of a larger project which employs a Mixed-Methods methodology utilising a Design-Based Research (DBR) approach, consisting of multiple cycles of design, testing, and refinement. DBR is used to develop and evaluate educational interventions in real-world contexts in collaboration with stakeholders, ensuring that the findings are both practical and transferable [20], [21]. This underscores the importance of designing educational initiatives that account for families' unique needs and contexts [22].

A. Participants:

Ukrainian refugees are distributed across Ireland's Local Electoral Areas (LEAs) at rates ranging from 0.28% to 10.81% of local populations. However, a clear rural-urban divide exists. This distinct rural settlement pattern guided the research focus on two cohorts of Ukrainian families with

children aged 5-13 residing across two LEAs in Clare, the county with the highest concentration. The study also incorporated perspectives from rural stakeholders, including local government representatives, rural community organizations, and the Ukrainian co-facilitators.

B. Delivery:

Delivery was preceded by a series of stakeholder meetings discussing the project's scope and practicalities and the training of two Ukrainian Translators/Co-Facilitators identified by local organizations. Two Programs were then delivered in the form of 4 x 1.5 hour workshops to a total of 10 families recruited by the stakeholders. The workshops took place over four consecutive days from 29 Oct 2024 facilitated by experienced instructors with the Ukrainian co-facilitators providing assistance and language support.

C. Data Collection:

A variety of research instruments were administered to stakeholders, parents and children (Table 1). Both quantitative and qualitative data were collected.

TABLE I. DATA COLLECTION INSTRUMENTS

Instrument	Timing	Participant	Purpose
Questionnaire	Pre-engagement	Local stakeholders	Identify barriers and opportunities.
Pre-questionnaire	Pre-Program	Parents	Establish current computing attitudes and behaviors.
Observations	Workshops	Families	Evaluate Program design and language/cultural issues.
Reactions	Post-workshop	Families	Evaluate interest and engagement
Focus Group	Post-Program	Families	Record the reactions of the families to participation.
Post-questionnaire	Post-Program	Parents	Evaluate impact on computing attitudes.

D. Data Analysis

The quantitative findings are limited in their validity and reliability as sample sizes were small and self-selecting in nature. They were therefore analysed as univariate descriptive measures to build a profile of the learners' attitudes and experience. For the qualitative data, content analysis was conducted through a structured process involving two researchers [24]. First, the material was read through multiple times to develop a comprehensive understanding and gain a "sense of the whole" [23]. Predetermined codes based on the key research concepts were developed (while remaining open to emergent themes), assigned to the text, and validated through intercoder agreement. Related codes were clustered into sub-themes and themes, which were peer-reviewed and validated by both coders. Finally, any uncoded data were analysed to determine whether they represented new categories or subcategories of existing codes.

V. FINDINGS

A. Stakeholder Findings

Questionnaires completed by nine individuals from local government, community and training organizations prior to Program implementation were analyzed to assess anticipated benefits, concerns, and alignment with integration objectives. All respondents expressed positive attitudes toward the initiative, recognizing it as a fun and engaging activity. They characterized it as "valuable" and "crucial" for integration purposes, highlighting its potential to simultaneously develop

technical skills and foster community connections. One respondent described it as providing “essential coding skills” and fostering “a sense of belonging.” The impact of skills development on educational and career advancement was also identified: “parents and children both discovering an interest in STEAM subjects/career directions” as well as improving access to English-speaking opportunities. Two respondents suggested the potential for expansion and diversification to further enhance integration outcomes.

Despite the positive reception, stakeholders identified several challenges to successful implementation. These included family and facilitator recruitment difficulties, language barriers, and sustaining long-term family commitment, particularly in the context of housing instability. These concerns align with existing literature on refugee program implementation, which identifies language barriers [23], housing instability [24] and recruitment challenges [25] as common obstacles to success. However, the stakeholders also proposed several practical recommendations to address these and enhance the initiative. These included: establishing partnerships with local schools and Ukrainian support organizations to facilitate recruitment; developing bilingual promotional materials to improve accessibility; implementing participatory co-creation methodologies to engender stakeholder ownership; instituting comprehensive feedback mechanisms; establishing sustained support infrastructures; training Ukrainian facilitators to ensure cultural relevance; and integrating the initiative within broader digital strategy and policy frameworks.

B. Participant Findings

Ten families (10 adults and 12 children) participated across both locations. Mothers constituted the majority of adult participants (n=9), while the children were balanced between genders with 6 boys and 6 girls. Attendance remained largely consistent throughout.

1) Observational Findings

a) Interest and Engagement

Observational data indicated positive engagement across participants, with all families successfully completing the assigned projects during each workshop session. Participants demonstrated increasing comfort with the non-formal learning environment as the Program progressed. The workshops were characterized by collaborative parent-child interactions, with families showing no difficulty adapting to the concept of working together on coding projects.

b) Language Considerations

Participants exhibited varying levels of English language proficiency, with most families utilising both Ukrainian and English during the sessions. The presence of Ukrainian co-facilitators proved valuable in supporting participants across the language spectrum. Many participants reported a preference for English-language coding platforms despite the availability of Ukrainian versions, citing alignment with printed instructions and recognition of English as “the standard language of programming.” Some participants utilized additional tools such as Google Translate to facilitate communication and understanding of materials, demonstrating adaptive strategies for participation. Participants identified technical terminology as the most challenging aspect of language comprehension.

2) Participant Feedback

a) Focus Groups

Analysis of focus group data revealed several consistent findings. Interest and engagement was high with participants appreciating the collaborative approach and craft integration while also expressing interest in progression to more challenging activities. They reported personal enjoyment in coding activities, with one parent expressing interest in pursuing coding professionally. They also consistently recognized the value of coding skills for their children’s future career prospects. Several participants suggested providing materials in advance to allow familiarization with specialized English terminology. The potential for the initiative to support community integration was recognized and parents expressed interest in workshops alongside non-Ukrainian families. Some suggested incorporating additional game-based icebreaker activities to facilitate social connections. They appreciated the opportunity to partake, commenting on the lack of local activities because “Kilkee is so far from everywhere”.

b) Reaction Forms

Analysis of 84 post-workshop reaction forms (completed after each of the four sessions by the 22 participants) revealed overwhelmingly positive responses across all measured dimensions (Fig. 1):



Fig. 1. Family Reactions (n=84)

Supporting qualitative comments further illustrated participant satisfaction, with statements such as “I would like to continue coding” and “it would be great to have such classes on a permanent basis”.

c) Pre- and Post-Program Questionnaires

All 10 parent participants responded to the two items measuring their future intentions. Unsurprisingly, as they were self-selecting, four strongly agreed pre-workshop that they would like to take part in computing activities with their families in the future. However, post-workshop the number strongly agreeing had increased to six (Fig. 2). Of the others, three remained on ‘agree’ and only one had dropped from ‘strongly agree’ to ‘agree’.

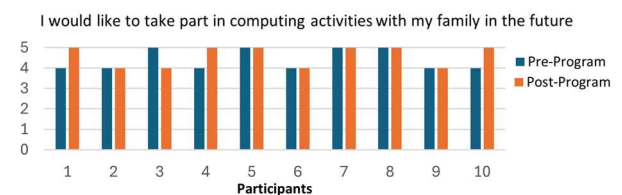


Fig. 2. Future Intentions (n=10)

When asked post-Program whether they felt able to organize CS activities with their families two out of the 10 respondents reported feeling more able than pre-workshop with the rest remaining the same (Fig. 3).

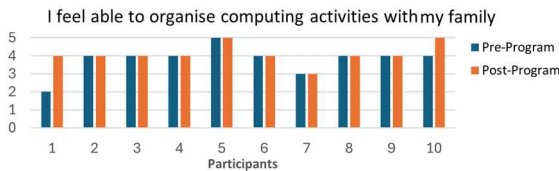


Fig. 3. Readiness for Future Activity (n=10)

The mean response for each of the eight items exploring the participants' perception of the Program was calculated and the participants were overwhelmingly positive with all items reporting a mean of 4.5 (Fig. 4).

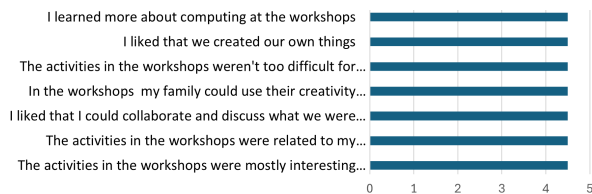


Fig. 4 Participants' perceptions of the-Program (n=10)

Comparison of pre- and post- questionnaires showed that baseline confidence in computing was already high (mean=3.91 on a 5-point scale), likely due to self-selection effects. The post-Program mean (3.82) showed a slight decrease. However, the small sample size means that we need to be wary of interpreting this as reflecting a real effect.

VI. DISCUSSION

This study revealed several insights with implications for computing education interventions, refugee integration practices, and family-centred educational approaches. The findings are discussed across four key dimensions identified by the research questions: interest and engagement, barriers, language and cultural mediation and integration potential.

A. Interest and Engagement

The family-centred approach represents a departure from traditional computing education models that typically target children or adults exclusively. Our findings suggest that this inclusive approach may yield multiple benefits. First, parental involvement appears to enhance engagement and completion rates, with families overwhelmingly reporting positive reactions to the experience. Second, the intergenerational aspect of learning created unexpected outcomes, with parents not only supporting their children but developing their own interest in coding. One parent's expressed intention to pursue coding professionally suggests that family-centred computing initiatives may serve as pathways to professional development for adults, a finding consistent with research on parental learning through family educational activities [8], [26], [27]. The blending of digital and tangible elements (coding and craft) appears to have facilitated engagement across different learning preferences and age groups. This corresponds with contemporary understanding of learning pathways that emphasize the importance of physical manipulation alongside digital interaction particularly for novice programmers [28].

B. Barriers

Initial research identified childcare accessibility and geographical isolation as posing particular barriers for the target community. On a purely practical level, the family-centred model circumvents the need for parents of dependent children to access and pay for childcare to participate. The

initiative's location in rural communities highlights the potential for computing initiatives to address geographical marginalization, a common challenge for refugee populations settled outside urban centres. Collaborating with local stakeholders meant that the Program could be offered in local community centres. Local knowledge was also crucial in recruiting the co-facilitators/translators and families. The stakeholders also identified concerns regarding language barriers, participation levels, and housing instability which reflect well-documented challenges in refugee initiative implementation [23], [24]. Their suggestions regarding bilingual materials, local recruitment, and prioritization of vulnerable populations demonstrate awareness of these challenges and propose evidence-based mitigation strategies.

C. Cultural and Linguistic Mediation

The language dynamics observed highlight both challenges and opportunities when delivering computing education to refugee populations. While English proficiency varied among participants, combining access to translators, video demonstrations, and printed materials, created an accessible learning environment despite technical language barriers. Using Ukrainian co-facilitators alongside English-speaking instructors, offers a model of language mediation that acknowledges both immediate comprehension needs and longer-term integration goals. This represents a promising practice for technical education in multicultural contexts, providing immediate access while building capacity in the host country's language. The recommendation to train Ukrainian facilitators also aligns with research on culturally responsive programming, suggesting that programs led by members of the refugee community may achieve higher engagement and effectiveness [29].

The preference for English-language coding platforms, even when Ukrainian alternatives were available, suggests recognition of English as the lingua franca of programming. This finding aligns with previous research findings that digital skills acquisition can serve as a pathway to language integration for refugee populations [30]. The request for pre-workshop materials to familiarize themselves with technical terminology indicates participants' metacognitive awareness of the specialized language demands of computing education.

D. Integration

Stakeholders highlighted the potential for the initiative to support the integration of refugee families into local communities. This was reinforced by parent feedback, with several expressing interest in workshops that included Irish families. The findings indicate that computing education may offer unique advantages as an integration context compared to other social programs. Coding potentially provides a shared language and objective measures of success that transcend cultural boundaries. Additionally, engaging families may address intergenerational digital divides while preserving family cohesion, a crucial factor in successful integration outcomes [31]. By providing both technical skills and social connections, initiatives like OurKidsCode may mitigate multiple dimensions of isolation simultaneously. This suggests that family computing initiatives may function as spaces where diverse communities can engage around shared interests despite cultural and linguistic differences.

VII. CONCLUSIONS AND FUTURE WORK

Several limitations should be acknowledged when interpreting these findings. This was an initial pilot and the

small sample sizes and self-selecting nature of participants limit generalisability and likely resulted in positively biased outcomes due to pre-existing interest. Also, the short-term nature of the evaluation cannot capture longer-term impacts. Future research will include more families and explore longitudinal outcomes, examining whether initial enthusiasm translates to sustained engagement. The project will leverage its existing network of family-led coding clubs across rural Ireland to explore whether the social connections formed during the initiative can facilitate broader community integration. In addition, research will examine the transferability of the model to other refugee populations and contexts. The question of whether family-led approaches might address the tension between participants' desire for continued activity and the resource-intensive nature of formal workshop delivery will also be explored. Such research could contribute to developing sustainable models for ongoing computing education support in refugee communities.

The pilot Program demonstrates the potential of family computing education initiatives to address multiple needs within refugee communities simultaneously building technical skills, fostering inter- and intra- family relationships, and creating pathways for community integration. The positive reception among local stakeholders and the Ukrainian families suggests that family computing education, when appropriately structured and linguistically supported, can create meaningful engagement despite the challenges of displacement and cultural adaptation. The findings contribute to emerging understanding of digital learning as not merely acquisition of technical skills but a social practice embedded in cultural and relational contexts. By acknowledging and leveraging these dimensions, initiatives like OurKidsCode may enhance both the effectiveness and sustainability of computing education interventions for refugee populations.

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