AI for Community: A Student-Led Initiative Promoting Sustainability Awareness Through App Development and Community Engagement

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I. Introduction

Sustainable issues, such as climate change, pollution, and biodiversity loss, pose urgent global challenges. However, environmental education often remains confined to theoretical approaches, limiting student engagement in practical solutions [1]. While artificial intelligence (AI) has transformed numerous fields, its potential to empower K-12 students in addressing ecological issues remains largely untapped [2].

This paper presents AI for Community, a student-led initiative where high school students develop AI-powered solutions for sustainability. Starting with a biodiversity-focused Native Plant Awareness app, the initiative demonstrates the impactful intersection of technological innovation and environmental conservation. Building on this foundation, the initiative has expanded to address other sustainability challenges—such as ocean conservation and senior care, demonstrating how AI can drive both environmental and social impact.

Through our work, we highlight a scalable model for integrating cutting-edge technology into sustainability education, which is helpful for schools and communities looking to implement similar programs. The paper details the initiative's development, expansion, and results in leveraging AI to advance broader sustainability goals.

II. Related Work

Recent advances in artificial intelligence (AI) have enabled innovative approaches to ecological conservation. Machine learning, particularly computer vision, has been applied to species identification and biodiversity monitoring [3]. Mobile applications like iNaturalist and PlantNet demonstrate how AI can engage community members in scientific research by automating plant recognition [4]. However, most existing tools focus on general biodiversity rather than emphasizing the ecological benefits of native species—a gap that this project seeks to address.

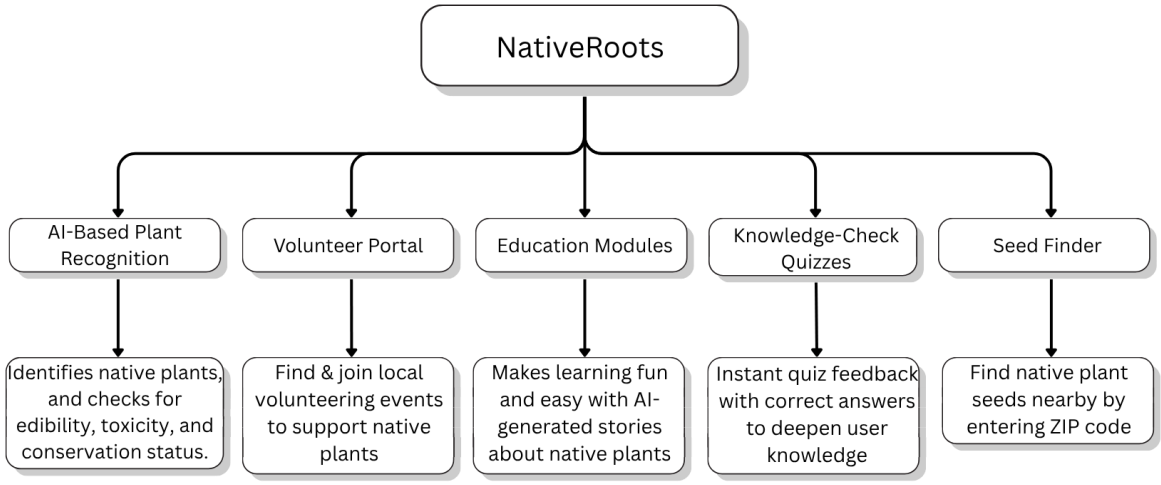
Extensive research confirms that native plants are foundational to healthy ecosystems, supporting pollinators, reducing water use, and helping to resist the spread of invasive species [5]. Non-native ornamental species, in contrast, often require chemical inputs, disrupt food webs, and contribute to habitat degradation [6]. Public awareness remains low, partly due to a lack of accessible educational tools [7]. Prior interventions, such as community workshops and signage, have had limited scalability, suggesting a need for technology-driven solutions [8].

Student- and community-led projects are increasingly leveraging technology to advance sustainability. Examples include youth-developed apps for recycling [9] and AI-based platforms for monitoring urban green spaces [10]. Such initiatives amplify environmental impact and foster STEM skills and civic engagement. However, few studies have evaluated the long-term effectiveness of these interventions or their potential to influence community behaviors.

III. Initiative Inception

The project originated from direct observations of ecological deterioration in local communities, where residential landscapes dominated by non-native species exhibited reduced pollinator activity and excessive water consumption, clear indicators of unsustainable practices. A preliminary survey of community members (n = 200) revealed a striking disconnect between environmental values and action: while 90.8% acknowledged the importance of native plant conservation, only 25.2% have cultivated native plants, and only 14.8% reported prior educational exposure to the topic. The predominant barrier, identified by 89.6% of respondents, was a lack of practical knowledge.

To address this awareness-action gap, we developed the Native Plant Promotion App, an AI-powered mobile application designed to enhance awareness and promote action. Its key features include AI-Powered Plant Recognition (real-time plant recognition through image classification of native/non-native species and checks for edibility, toxicity, and conservation status), Volunteer Opportunities (state-based listings for community contributions through volunteering), Education Module (AI-generated stories about native plants to make learning easy and fun), Knowledge-Check Quizzes (quiz that provides instant grading to deepen user knowledge) and Seed Finder (discovery tool to find free native plant seeds nearby through ZIP code).



App Overview

IV. Expansion and Growth

The initiative grew as we focused on scaling impact through two parallel programs.

First, we launched educational workshop series (both in person and on Zoom) to share knowledge about native plants and AI-driven sustainability solutions, using our mobile app as a foundational case study.

These workshops combined technical training on environmental app development with hands-on ecological action, including distributing seed packets to empower community involvement.

At the same time, we partnered with local plant societies and gardening groups to elevate sustainability awareness within communities. These collaborations also provided valuable user feedback, enabling continuous improvement.

Our expansion strategy intentionally merged digital innovation with on-the-ground interventions to achieve three key goals: deepening community engagement, building technical expertise in environmental AI, and driving measurable ecological impact. With the success of our pilot, we now plan to scale this model nationwide. This structured approach not only equips students with skills for today but also empowers them to develop solutions for tomorrow, opening new pathways for sustainable innovation.

V. Results

The pilot testing of the Native Plant Promotion App included 50 middle and high school students participating in two virtual workshops. Students explored the app's main features: AI-powered plant identification, educational content, and interactive quizzes, centered around native plant knowledge, care practices, and broader ecological themes. Learning outcomes were promising. Participants demonstrated a 77% improvement in native plant identification scores, as measured by pre- and post-assessments conducted during the workshops. Additionally, 83% of students expressed strong intent to continue using the app and to share it with friends, family, or school groups. Feedback highlighted the meaningful impacts that extend beyond knowledge acquisition. Students reported greater confidence when discussing sustainability topics and a deeper appreciation for local biodiversity. Most described the app as easy to navigate and engaging, with many praising the real-time identification tool. Several noted that the quiz features helped reinforce what they learned. Qualitative interviews revealed deeper personal engagement. One student shared, "I never connected coding with environmental help before， now I want to build apps for coral reefs." Another said, "This was the first time I learned something that made me want to go outside and plant." Others described plans to introduce the app to school clubs or community gardens, suggesting early signs of peer-to-peer outreach.

Our app has also played a key role in advancing sustainability and native plant protection by equipping volunteers and plant society staff with innovative, safety-focused tools. At a Mass Audubon-organized community garden cleanup, volunteers using the app made a valuable discovery: while removing invasive plants, they needed quick identification of toxic species, such as poison oak, that was mixed in with the foliage. This hands-on feedback led us to enhance the app's identification feature. Now, the app not only sorts native and non-native plants but also clearly flags poisonous species, helping volunteers stay safe while restoring local ecosystems. For gardeners, it identifies edible and non-edible plants, making it a valuable tool during harvests. Beyond safety, the app now drives greater community involvement in conservation efforts. After hearing that the local plant society struggled with event visibility, we added a Volunteer Portal, making it easier for users to discover and join native habitat restoration projects. As a result, participation in local sustainability initiatives has grown, turning awareness into action.

By merging technology, education, and hands-on conservation, this initiative strengthens the connection between people and their environment, fostering long-term stewardship of native ecosystems.

VI. Conclusion

The AI for Community initiative showcases the transformative potential of student-led, AI-driven solutions in addressing environmental sustainability challenges. By integrating artificial intelligence with environmental education, the project achieves dual outcomes: enhancing ecological literacy while motivating tangible community action.

We employ a blended engagement strategy through partnerships with youth volunteer groups for environmental education, collaborations with plant societies and gardening communities for hands-on conservation work, and social media outreach to expand our network of native plant preservation. This step-by-step approach transforms small wins into significant impact, creating a system where tech skills align with real environmental needs.

As the initiative expands, the combination of technical education and practical ecological interventions offers a scalable model for promoting sustainability. By equipping students with both AI skills and environmental knowledge, the project demonstrates how digital tools can inspire lasting change and motivate youth to take action in their communities.

VII. Acknowledgement

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VIII. References

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