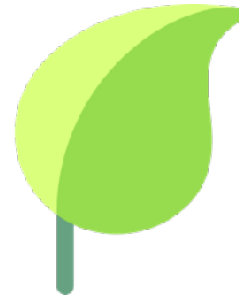


GENEVA CHALLENGE 2020



Green Beans:

CONNECTING COMMUNITIES
FOR A MORE SUSTAINABLE WORLD

Nguyen Phan Bao Linh, Laud Boateng, Yu En Hsu, Kyle Winters, Sparsh Kansal



Abstract

Climate change is a top concern among millennials and Gen Z, and the 2019 school strike for climate change, one of the most notable movements by students, proves the youths' desire for more significant and actionable plans from the governments. In addition to policies for making collective progress, increasing awareness and educating citizens on climate change are crucial for contribution on individual and community levels.

The United Nations launched several programs to expand climate change education, starting from 1992's Earth Summit. Although the discussions were restricted to formal education by the end of 1999, programs in the 2000s expanded to informal channels through media and network. Still, after reviewing relevant materials, the team identified a persistent need for a platform that will engage multiple stakeholders, particularly students and youths. Moreover, the existing solutions in climate change education did not provide motivations for behavioural change in real life. To address the issue, our innovation

GreenBeans, an application for climate change education, brings together mobile and adaptive learning that utilises learning experience design to create a solution that builds community around beginning enthusiasts, climate change learners and educators, experienced eco-activists. Overall, GreenBeans provides a personalised learning journey that will provide motivations for behavioural change.

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Acronyms

CCE	Climate Change Education
CCESD	Climate Change Education for Sustainable Development program
COP	Conference of the Parties
ESD	Education for Sustainable Development
LMIC	Low-Middle Income Countries
LXD	Learning experience design
MDGs	United Nations Millennium Development Goals
NDC	Nationally Determined Contributions
NOAA	North Oceanic and Atmospheric Association
SDGs	United Nations Sustainable Development Goals
UNCED	United Nations Conference on Environment and Development
UNESCO	United Nations Educational, Scientific and Cultural Organisation
UNFCC	United Nations Framework Convention on Climate Change

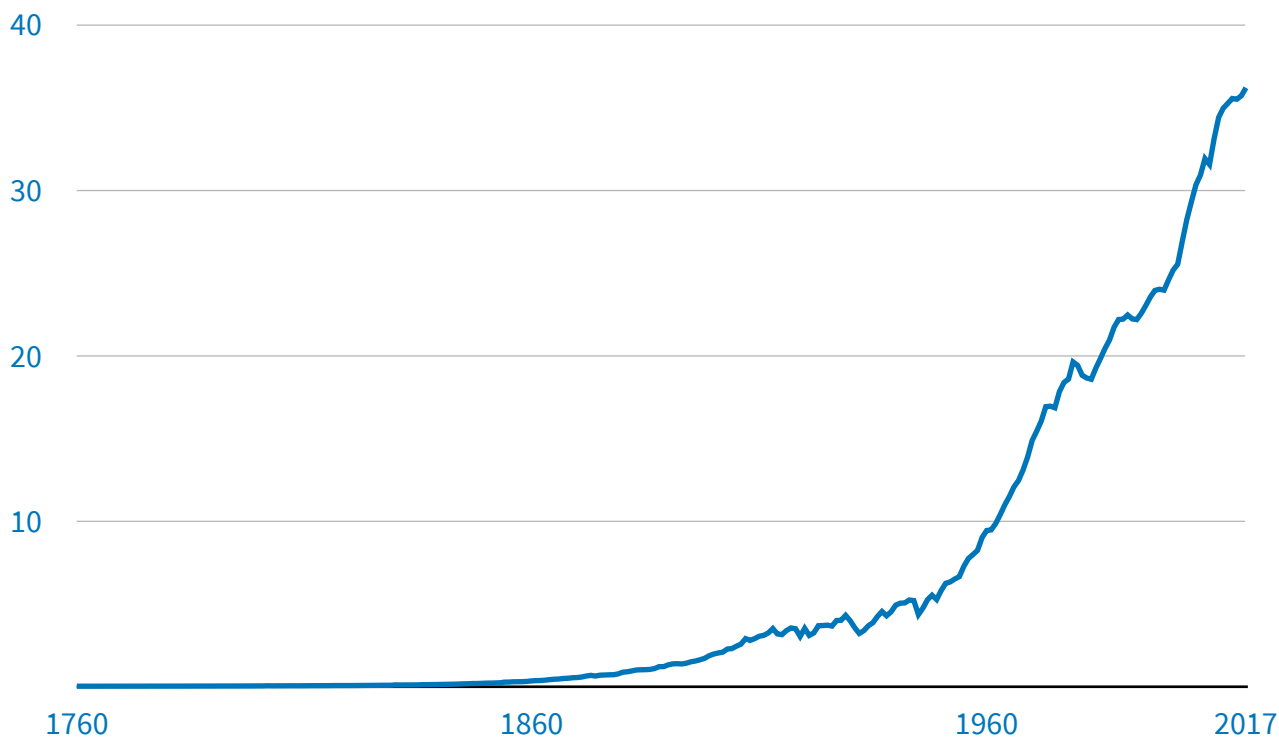
1. Background



1-1. CLIMATE CHANGE AGENDA

Transforming our World: The 2030 Agenda for Sustainable Development, a plan of action for people, planet, and prosperity that seeks to strengthen universal peace in larger freedom, was adopted by the General Assembly of the United Nations on the 25th September, 2015 (United Nations, 2015a). The agenda ambitiously expanded the eight previous Millennium Development Goal (MDGs) to seventeen Sustainable Development Goals (SDGs) with 169 indicators. The unanimously adopted “social contract between the world’s leaders and the people,” as former Secretary-General Ban Ki-moon called it, demands action from all countries, developed and developing, enjoying the peace or experiencing conflict (United Nations, 2015b).

Figure 1. Annual total CO₂ emissions



Unit: Billion tonnes

Data Source: Le Quéré et al. (2018). Global Carbon Project; Carbon Dioxide Information Analysis Centre (CDIAC)

Agenda 2030 can and should be interpreted as an urgent call that requires the governments and everyone to take immediate action to combat climate change and its impacts (United Nations, n.d.-a). The second decade of the 2000's leaves the world with depressing figures in terms of climate change action. The amount of carbon dioxide and other greenhouse gases generated in 2019 reached a record high, nearly 50 per cent rise since the 1990s (United Nations, n.d.-b), as shown in Figure 1. While COVID-19 has temporarily halted leading emission producers, this will not last. Without more efforts from the individual and global levels, it's unlikely that the world will achieve Agenda 2030.

In 2016, 190 states signed the **Paris Agreement on Climate Change**—the first-ever universal, legally binding global climate change agreement. The unprecedented document prescribed frameworks in greenhouse gas emissions, strategies in climate adaptation, and financing. It further obliged states to record the progress in climate change actions and submit biennial report starting from 2024 (Huang, 2019), enabling assessments of the progress towards the long-term goals. However, Emissions Gap Report 2019 points out that countries collectively failed to stop the growth in global GHG emissions (UNDP, 2019).

The **Global Millennials Survey 2020** conducted by Deloitte shows that, among 20 pre-listed challenges, 31% of millennials and 28% of Gen Z defined the environment and increasing natural disasters as top concerns (Deloitte, 2020). Evidence suggests that these concerns are not groundless (The Intergovernmental Panel on Climate Change, 2014). The climate crisis is disproportionately affecting the most vulnerable populations. Children and adolescents with disabilities, young girls and boys, minority and migrant groups, are often less able to manage climate-related risks and are least represented in decision-making processes (UNICEF, 2015).

Responding to the urgent need to scale-up climate action, the Secretary-General convened the **Climate Action Summit** on 23rd September 2019 to focus global attention in the face of the worsening climate crisis. While facing the hottest decades in the history of humanity and highest sea level, the United Nations leadership called for radical change during the **Decade of Action** and solutions involving a wide array of partners, technologies, and methods to rocket both governments and citizens into a new green era.

1-2. CLIMATE CHANGE EDUCATION FRAMEWORK

Climate change education (CCE) is recognised as an essential pillar to achieve a sustainable future. Ideas around CCE and its benefits formalised with new scientific discoveries in the 1990s. CCE was first acknowledged at the 1992 United Nations Conference on Environment and Development (UNCED) **Earth Summit**, in which 178 participating governments committed to provisions outlined in Agenda 21.

Chapter 36 of Agenda 21 recognised that education, training, and public awareness are critical for CCE and called for a reorienting education towards sustainable development. The United Nations Educational, Scientific and Cultural Organisation (UNESCO) was the primary custodian agency supervising the implementation (UNCED, 1992). Parallel articles were reiterated in three Rio Conventions in 1992—the **United Nations Framework Convention on Climate Change** (UNFCCC), the **United Nations Convention on Biological Diversity** (UNCBD), and the **United Nations Convention to Combat Desertification** (UNCCD), with roadmaps

approved by the Member States (UNESCO, 2014a). However, by the end of 1999, discussions on CCE remained on formal education. In 2002, the United Nations General Assembly solidified its commitment for ESD by proclaiming the period from 2005 to 2014 the **United Nations Decade of Education for Sustainable Development** (DESD), emphasising education as a vital element in the process of achieving sustainable development (UNICEF, 2002).

1-3. PROGRESS IN ESD AND CCESD

Acknowledging the pressing need to incorporate environmental and development education into school curricula, UNESCO integrated CCE into education for sustainable development (ESD) in 2010. It was the beginning of UNESCO's **Climate Change Education for Sustainable Development Programme** (CCESD), which aims to help people understand climate change by expanding CCE activities to informal education through media, networking and partnerships (UNESCO, 2018).

In 2015, UNESCO summarised that CCESD empowers learners to make informed decisions and responsible actions, while accounting for environmental integrity, economic viability, and social justice for present and future generations. It also focuses on encouraging changing attitudes and behaviours towards a more sustainable development path and building a new generation of climate change-aware citizens (UNESCO, 2015).

With the proven findings, UNESCO created the **Global Action Programme on Education for Sustainable Development** (GAP for ESD), a follow-up program to strengthen the results of DESD. It focused on developing global partnership networks in ESD, mobilising support from non-education stakeholders, such as local communities, and scaling up the capacity-building efforts for educators and movement leaders (UNESCO, 2019b). To achieve these goals, the GAP centred on five areas:

1. Advancing policy,
2. Transforming learning and training environments,
3. Building capacities of educators and trainers,
4. Empowering and mobilising youth, and
5. Accelerating sustainable solutions at the local level (UNESCO, 2014b).

The 2019 key partner report concluded that GAP was able to achieve all key indicators apart from target eight, training 1.7 million youth leaders. The result was 763,000 youths, 51% of the goal. This shortfall was because train-the-trainer programmes were more resource-intensive than expected. According to GAP partners, successful train-the-trainer programmes required in-depth coaching and systematic follow-up—for example through mentorships. The report stated that the outcome of learning for the new generation would largely depend on ESD’s ability to provide education that will result in real-life action and emphasise the individual impact in and out of the classroom (UNESCO, 2019a).

Greta Thunberg, 16-year-old environmental activist, boycotted school to protest against Swedish government inaction regarding climate change in 2019. Her actions lead to the school strike for climate, a global movement with millions of students demanding politicians to take steps against climate change (Barnard, 2019). A series of protests was one of the most notable expressions by young people. They re-opened the debate about the inability of institutions to integrate CCE into a traditional educational system and everyday life.

During **Climate Action Summit** in 2019, a group of children filed a complaint to the United Nations Committee on the Rights of the Child, protesting a lack of government action on climate change (UNICEF, 2019). This demonstrated students’ continuous commitment to advocate for environmental protection. It is essential that policy-makers seek ways to engage and to overcome polarisation around the necessity for climate consciousness (Guterres, 2020).



2. Problem Landscape



2-1. ESD FOR 2030: GOALS AND APPROACHES

UNESCO launched **Education for Sustainable Development: Towards achieving the SDGs'** (ESD for 2030) in 2019, a new framework built on the learnings and insights of GAP on DESD (2005-2014) and ESD (2015-2019). It will be implemented within the time from 2020 to 2030. According to the concept note, the overall goal is to build education systems that support learners of all ages to be active contributors to more peaceful and sustainable societies and develop a sense of responsibility for our planet (UNESCO, 2019d). The international community also reiterated their commitments to strengthen the achievements of previous ESD agendas and develop new channels to engage youths. The note also emphasised the integral role of ESD in achieving all 17 SDGs in Agenda 2030.

The roadmap was scheduled for presentation at the **World Conference on Education for Sustainable Development** in June 2020, however, because of COVID-19, the conference was postponed and the document has not yet been released (UNESCO, 2019e). Still, the **Framework for the implementation of Education for Sustainable Development (ESD) beyond 2019** outlined three

guiding approaches: transformative actions, structural changes, and the technological future. These approaches were identified as the most relevant bottlenecks from previous ESD agendas that will require new tools and methods to be addressed in the implementation of ESD for 2030 (UNESCO, 2019c).

Transformative approach has been a persistent priority since Agenda 21. After GAP's conclusion in 2019, data and fieldwork suggested that ESD should design projects that would accompany individuals throughout the process of learning and transitioning to a more sustainable lifestyle. interventions should take place gradually, instil values of sustainability both inside and outside of school, and lead to actions and lasting behaviour changes. According to SDG4, the biggest challenge for transformative action is to motivate individuals to adopt sustainable lifestyles. It recommended to discover ways to collect data about individual values, beliefs, and current reality, connecting ESD efforts to a person's sense of identity, community belonging and exploration.

Structural approach is based on the learning that individuals are limited by the boundaries of their social and economic status. Policymakers must consider various factors that might influence the adoption of a sustainable agenda. For example, full complexity and relevance of the concept of sustainable development might not immediately resonate with people trying to survive daily. Given that the vulnerable and impoverished communities around the world are predicted to be affected by climate change the most, ESD interventions are essential to be delivered there. To maximise the effect of ESD, learning experience in such target populations should be contextualised to the reality, appeal to community identity, and contribute to their chances to survive, obtain and sustain a dignified livelihood.

Technological approach states that policymakers should balance between usage of digital tools to advance knowledge and maintenance of traditional sustainability values. ESD should be flexible and customisable to address usage gaps and barriers to access the learning platforms. The framework emphasises that the implementation of technology in ESD should not be the end goal, but rather another tool for individuals and communities to gain access to the CCE, practice sustainable behaviours, connect to a more significant movement and other community stakeholders (UNESCO, 2019c).

FIGURE 2. NEEDS ASSESSMENT

UNCED

Review of Implementation of Agenda 21 and The Rio Principles

- Develop universal agreement around the need for ESD
- Enable multiple stakeholders to participate in the decision making process at national and local level
- Integrate ESD into all levels of formal education
- Mobilise of international financial support for ESD
- Improve national and international partnership in ESD field
- Involve educators and CSOs in ESD advancement
- Establish ESD responsiveness to economic and social context

DESD

Shaping the future we want: UN Decade of Education for Sustainable Development

- Strengthen ESD policy in all types of education
- Transform learning and training environments
- Build capacity of educators and trainers
- Empower and mobilise youth
- Accelerate sustainable solutions at the local level

GAP

Global Action Programme on Education for Sustainable Development

- Enable greater social and emotional and behavioural learning processes

United Nations Framework Convention on Climate Change

- Ensure integration of community-based action learning

Education for Sustainable Development Goals: Learning Objectives

- Provide the opportunity for students to practice ESD in immediate environments
- Improve inclusion rate for a number of learning indicators

ESD for 2030 inherited valuable assets from previous programs. Firstly, the GAP partner network consisted of 90 organisations around the world with extensive outreach and innovation capacity. It contributed to synergies between the members and catalyse action from other ESD stakeholders. Secondly, GAP made considerable progress engaging with educators and CSOs. More than two million educators participated in capacity-building, and over five thousand networks and CSOs conducted ESD activities. Thirdly, previous programs created a database of resources, such as guidelines, curricula samples, and reports. All the materials can be utilised for developing further knowledge and skills among stakeholders. These assets should be incorporated into future ESD for 2030 projects and solutions.

2-2. NEEDS ASSESSMENT

CCESD and ESD have been carefully studied since initial deployment in 1992. Each new roadmap was drafted based on the learnings from the previous ESD program. Today, ESD is the core element to achieving 17 SDGs of Agenda 2030. To identify the essential needs in CCE and ESD, the team conducted a need assessment based on monitoring and evaluation (M&E) reports. We opted out of in-depth interviews and stakeholder surveys for two reasons. Firstly, given the fact that climate change and sustainability education is inter-connected to multiple sectors and priorities, it was challenging to identify leaders and experts in the field. Secondly, existing reports provided us with findings collected from surveying stakeholders in the ESD field. Our team determined these reports to be an unbiased overview of ESD with pain points in adoption and execution. The need assessment on the next page guided our solution design to address bottlenecks and improve adoption of CCE and ESD.



The process revealed a persistent need for a solution that will allow ESD to engage multiple stakeholders, focusing on engaging students and young adults. Moreover, the solution must meet one or more of the following needs:

- provide emotional and behavioural training,
- enable local and community-based mobilisation for ESD, and
- accelerate the capacity for non-government agents to participate in policy and decision making.

A practical solution should be transformative, structural, and technological. In other words, it must tailor for individual motivations, community values, and regional contexts and be accessible for everyone.

2-3. CHALLENGES

1

States have different ESD implementation capacities.

2

ESD curricula quality and priorities vary state by state.

3

Learning requires time, training and other resources.

4

Formal education is discriminatory.

5

Current engagement strategies are not sufficient.

2-3-1. States have different ESD implementation capacities.

Countries often have varying technical capacities to integrate climate change curricula and ESD-related activities into the educational system. Given the interdisciplinary nature of CCE, it can be challenging to reconcile economic growth with the principles of sustainable development, as current industrial and production patterns continue. Therefore, political willingness to support CCE and ESD are different across the states. The discrepancies can affect the content of CCE, the delivery, funding, and intention to shift economic growth towards green growth. Future programs should consider informal and non-formal avenues to deliver climate change curricula to target audiences in the advancement of ESD.

2-3-2. ESD curricula quality and priorities vary state by state.

95% of all countries, parties to the Paris Agreement have included some climate change education content in some of their recent country submissions to the UNFCCC Secretariat. However, curricula quality and priorities vary from state to state (UNESCO, 2019f). These differences are often country- and region-specific and can easily be omitted in modern tools, designed to serve multiple stakeholders in various localities. Solutions created to support ESD must find a healthy balance between conceptual teaching knowledge on climate change and customisation of the curricula necessary to appeal to multiple target audiences in different parts of the world.

2-3-3. Learning requires time, training and other resources.

There are three learning dimensions in formal education: cognitive, providing students with an understanding of scientific concepts and origins of climate change; socio-emotional, establishing the feeling of a broader responsibility to advocate for climate change; and behavioural, enabling students to explore active pathways to climate action. Most delivery agents (i.e. educators, trainers) are not trained to teach and test the following two dimensions.

Furthermore, agents are not equipped with sufficient time and tools to establish and measure emotional and behavioural dimensions. As a result, behavioural topics such as “public participation” only account for 4% of national curricula (UNESCO, 2019g). ESD for 2030 programs must acknowledge

that the goal of a CCESD is to convert awareness and understanding into individual or community climate action. Future solutions should ensure adoption of emotional and behavioural learning by aiding educators and delivery agents with needed tools and learning resources.



2-3-4. Formal education is discriminatory.

COVID-19 has proven that a majority of institutions were not prepared to transition to online learning from primary education to collegiate. According to UNESCO, over 60% of the global student body has been impacted by school closures. The social distancing measures exposed severe inequity in the technical capacities of learners from different income groups. ESD for 2030 should curate affordable open educational resources (OER) and incorporate accessible platforms to maintain and facilitate continuous learning offline and online.

2-3-5. Current engagement strategies are not sufficient.

No more can education support the idea of an investment in human capital for the labour market - it must take on a holistic approach that can resonate and develop all who seek out knowledge. In terms of education stakeholders, national governments and educators have signed on to the GAP in impressive numbers. GAP educators alone have exceeded target goals by 16 per cent (UNESCO, 2020).

Yet, GAP youth engagement, and various other initiatives, have continuously fallen short of target goals, and therefore long-term impact. A majority of this challenge can be attributed to a concentration on formal education that focuses on enrolment instead of retaining knowledge. Additionally, more often than not, attention to formal education overlooks marginalised children, women, indigenous youth, and those with disabilities. Not only are we headed for a reality whereby 2030, 69 per cent of 15 – 19-year-olds will not complete their secondary studies, but an additional growth in the gap of those who miss out on education about climate change while suffering its effects (UNESCO, 2020).

2-4. OPPORTUNITIES

- 1 **Mobile learning**
- 2 **Adaptive Learning**
- 3 **Learning experience design (LXD)**

2-4-1. Mobile learning

The past decade we have seen a shift in computer usage to mobile usage. In **GSMA The State of Mobile Internet 2019 Report**, 57% of those surveyed in developing countries accessed the internet exclusively via phone in the last three months. In 2018 alone almost 300 million people connected to mobile internet for the first time, bringing the total combined population to more than 3.5 billion people globally (GSMA, 2019) even though coverage and user gaps are still present.

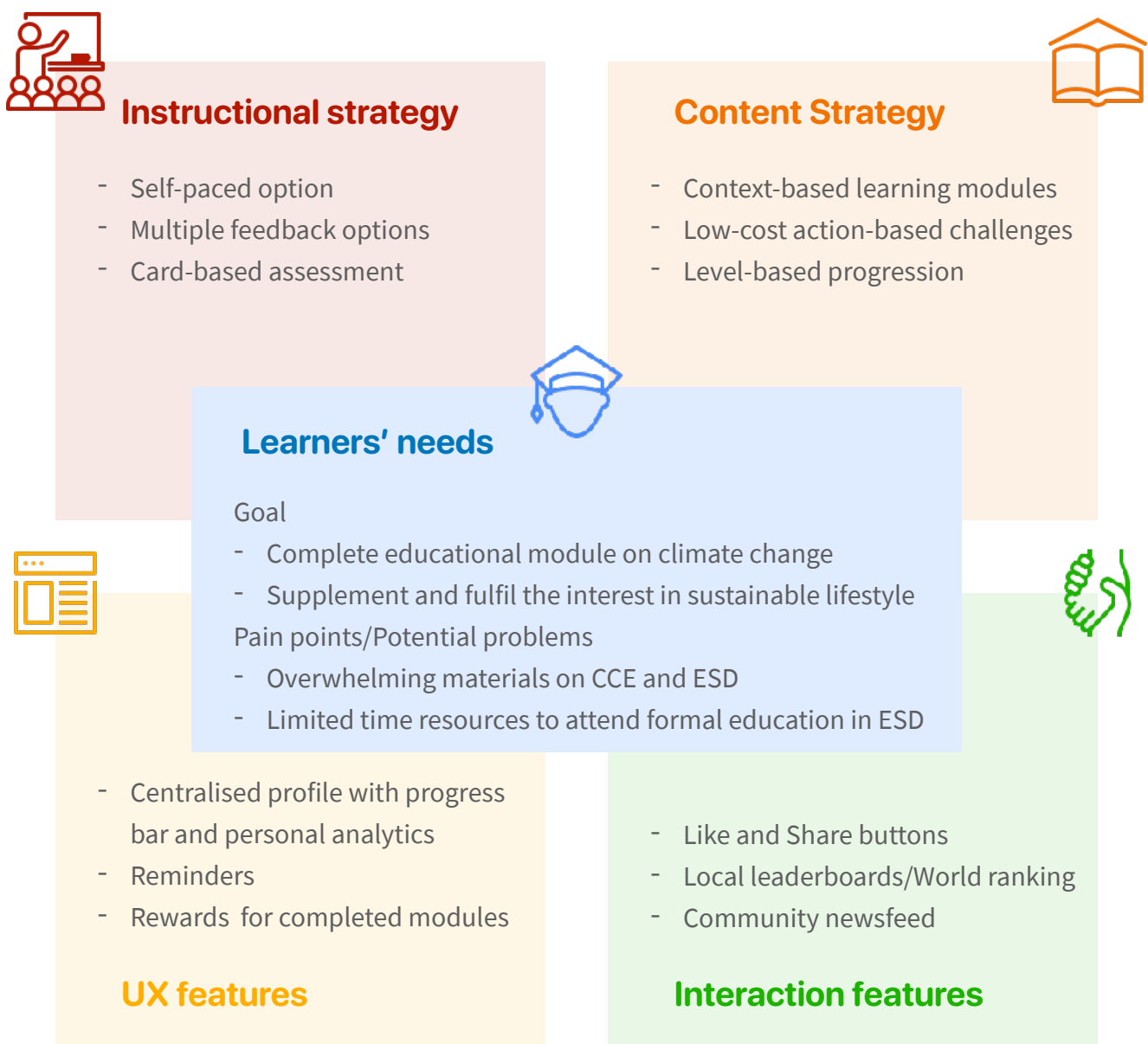
In 2018, the Pew Research Center reported that 59% of adults globally own a smartphone (Poushter, 2018), and research from the EDUCAUSE Center for Analysis and Research indicated that 95% of undergraduate students own smartphones. In the past decade, the flexibility, convenience, and sometimes the necessity of using a mobile device to access learning content have become drivers for learners to participate in education actively.

2-4-2. Adaptive learning

It is no longer enough for an educator to conduct asynchronous teaching, create content or provide reference materials. To stay engaged students seek learning content that is adaptive and responsive; micro-learning experiences that can give learners the autonomy over their learning experience. Adaptive technology opens up opportunities to personalise student learning and as a result, achieve higher engagement with the curricula (EDUCAUSE, 2020).

It also allows the role of the instructor to evolve, away from content delivery in the form of lectures during class and toward the roles of leader and coach during active learning exercises. Adaptive systems make this change possible by providing students with all of the instructional resources online and essential conceptual content to revisit before teaching lessons in classrooms.

FIGURE 3. LXD MATRIX



2-4-3. Learning experience design (LXD)

The rapidly emerging field combines knowledge in design thinking, user experience (UX) research, system design and student analytics to achieve the ultimate purpose of fostering student success in learning. This trend in the educational industry stimulates stakeholders to form partnerships and exchange experiences to identify lapsing areas in learners' motivations and institutional value propositions (content, instruction). Group efforts and intelligence contribute to improvement in learning management systems (LMS) online and offline and in student engagement with the program.

The emergence of LXD into education has brought a new holistic, systems-thinking approach that encourages educators and trainers to measure how, where, and to what extent learning is happening in digital spaces and use these analytics and behavioural insights to guide curricula delivery and supplementation. LXD has various tools to introduce active learning and group engagement through gamification, virtual learning environments, instant feedback technologies.

3. Solution

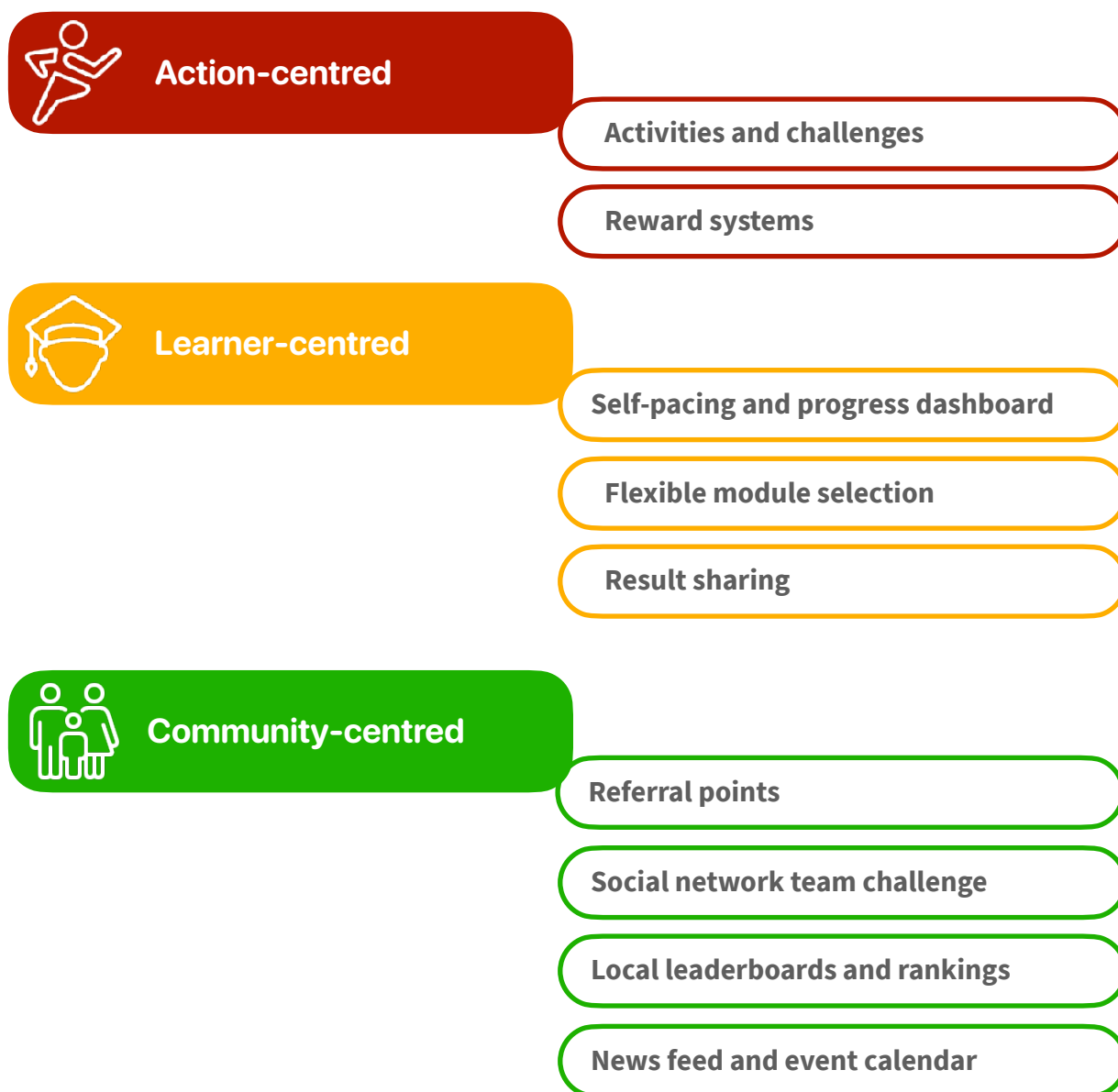


GreenBeans is a mobile application designed to teach students and young adults about climate change and a sustainable lifestyle. The primary purpose of the app is to provide a holistic CCE learning experience that is personalised, simple and fun. Our solution brings together mobile learning, adaptive learning and LXD practice to create a solution that builds community around beginning enthusiasts, climate change learners and educators, experienced eco-activists.

It offers a collection of features to address the challenges and needs in implementing ESD for 2030. Our group used adaptive learning principles to curate unbiased, engaging, and quality instructional content that meet the varying priorities of diverse learners and deploy instructional content for the ever-changing student demographics in a manner that achieves their desired learning objectives (Champion & Gunnlaugson, 2017, p. 6). Using best practices of mobile user interaction, we built-in features that will help learners to apply concepts of ESD in everyday life, to connect with community leaders and ESD partner organisations, and to become a part of a larger global climate protection movement.

3-1. FEATURES

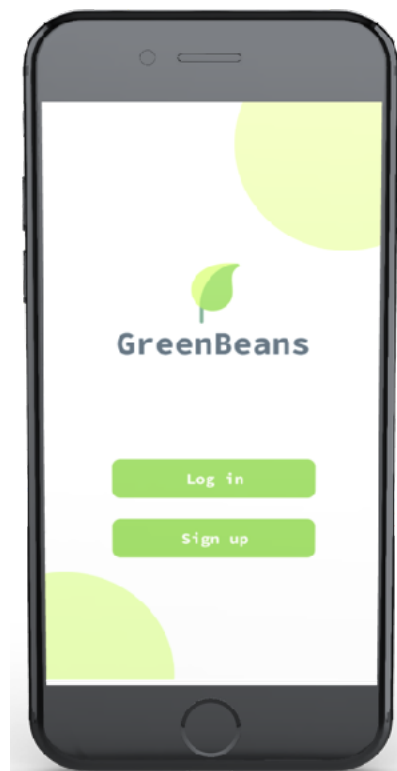
FIGURE 4. GREENBEANS FEATURES



3-1-1. Action-centred features

3-1-1-1. Activities and Challenges

GreenBeans is designed to pair absorbing information through the provision of educational materials with topic-related activities. Through the use of multiple levels – as one would find in a traditional online user-centric game – individuals will be challenged to various activities that will be tailored to the user’s locale. Area-dependent – such as urban versus rural – users will be challenged to participate in transformative activities. They will progress from watering a houseplant, sorting recyclables to more skill-demanding activities such as creating composting piles, planting trees, and finally to community-engaging ones such as organising clean-ups and community gardens. Each activity and challenge will be paired with relevant information on climate change, community engagement and leadership. We hope that, as users move through levels and activities become more significant in size, user’s knowledge and skill base will grow.



3-1-1-2. Reward systems

As mentioned above, GreenBeans is a multi-level app that encourages linear progression from first use. As the application is continuously being updated with real-time information, the potential for “levels” are infinite. Additionally, to encourage users to “level-up” in the application, completion points and badges are awarded. These badges will be bestowed upon users, in a public manner within the app, for actions such as participation streaks, recruiting new users, organising events, and various activities accomplished through the application.



3-1-2. Learner-centred features

3-1-2-1. Self-pacing and progress dashboard

When users log into GreenBeans, they will be brought to a “home” dashboard where they can track their progress on a weekly, monthly, and yearly range. On this dashboard, users will have the ability to set reminders and goals for themselves. These goals are important self-set markers that will ideally drive motivation, higher usage and motivation streaks. By allowing the user to set their own pace, we hope that the application will have broad flexibility for the diverse realities of its multiple users.

3-1-2-2. Flexible modules selection

In the spirit of having users set their own pace, at GreenBeans, we would like to give users further the power of which topics they would like to tackle and when. While all aspects of climate change education are essential, we realise that specific communities and regions may have a particular interest, at first, in one topic over another. Be it WASH goals, CO2 output/commuting, or food consumed, the choice falls upon the user on which theme or “module” to tackle and when.

3-1-2-3. Result sharing

Our group believes that it is essential for GreenBeans to instil a sense of accomplishment among its users. Users, as well as community networks, will have the option of having their activity published on local, regional, and global ranking boards as well as the number of social media networks. The goal here is to motivate

every individual effort, acknowledge and emphasise the importance of those actions in an attempt to protect the climate and the planet.

3-1-3. Community-centred features

3-1-3-1. Referral points

Recruiting other members will be rewarding in the levelling-up aspect of the GreenBeans application. These points will be based on how many new users an individual brings in, but also how much activities new users complete. Our team believes this will encourage accountability and peer support at the user level that will promote outside of the application commitment to the ESD and CCE.

3-1-3-2. Social network team challenge

As users recruit new members, they will have the option to form social networks within the app. These networks are intended to ease the burden of organising events and help with tangible actions motivated by the use of the app. The social network aspect of the app is designed to bring community members together to execute, diversify, and share in the labour of projects. We hope that while assigning team challenges, users will cluster together to form a more sustainable community of sustainably conscious citizens. Upon negotiations with various ESD partners, we hope to be able to reward the most active teams and communities with financial sum to fulfil their projects as a part in-app challenge. For example, this might increase participation in UNESCO-Japan Prize on Education for Sustainable Development.

3-1-3-3. Local leaderboards and rankings

Based on the ratchet mechanism used on an annual base in the Paris Climate Accords with nation-states, GreenBeans pledges its end-users in friendly competition amongst themselves. While we give users the option to set their timeline and accomplish activities/challenges at your leisure, users' activities will be added to statistics of greater geography. We intend that friendly set-up of the

application will set users against other users in a motivational street, district, city, region and country-level competition. Activities focused on collaboration between localities and geographies will also be available on higher levels and rewarded.

3-1-3-4. News feed and event calendar

A significant component of GreenBeans is keeping users in the know with accurate, scientific information. Our team hopes to develop this module with the help of ESD Network of Partners. End-users will be able to read news relevant to their physical location, connect to community leaders, and join partner organisations. Additionally, as the app is intended to assist an individual in transforming into an active climate community participant, users will have an ability to advertise their events in the community through the app. These events can be linked to challenges that various individuals or teams may be on. GreenBeans will also offer specific problems and activities dedicated globally essential events in the environmental community such as “Earth Day”, “United Nations Day”, etc.

3-2. FUNCTIONALITY

GreenBeans will use location-based computing technology and location data from users to sort pre-assembled learning modules with topics most relevant to their area appearing at the top of the main page. The application will employ various technologies including GPS, cell phone infrastructure, and wireless access points to further offer modules most popular among other users in the same locale

To create modules and curate challenges appropriate for each learning section, our group will conduct extensive consultations with key partners in pilot areas. Our team will further do topical modelling using natural language processing to go through large unsorted arrays of textual materials to extract insights about fundamental environmental problems within pilot communities. Lastly, we plan to analyse NDCs and local policy documents to make sure application modules complement formal education priorities of each state.

User-generated analytics such as which modules were the most popular in a specific area or what challenges generate the most engagement can be used to improve traditional school and higher education curricula, expand knowledge on sustainable activities most likely to be adopted by different target audiences in various locales.

3-2-1. Application

GreenBeans was designed to meet the needs of multiple users and ESD stakeholders. Our group distinguishes three major applications for GreenBeans. Firstly, applications can supplement the formal climate change education curriculum. The educator may choose to use the application to test the ability of students' to apply the knowledge acquired in class in everyday life. Upon the completion of the specific module in the app, the teacher may reward students with additional participation points.

“In-class” use of the application scenario presumes that the decision to adopt and explore GreenBeans is made for students by educators to complement school curricula. This might partially help avoid some of the early adoption barriers, such as loss of interest and motivation.

Secondly, the application can support individuals' curiosity to transition to a sustainable lifestyle. The emerging trends and growing support for circular economy, zero waste and minimalistic lifestyles can positively contribute to application adoption and continuous use. Social network features will assist these types of users by connecting them to the community of like-minded individuals, showcasing the closest ESD partner organisation.

“Lifestyle” use if the application scenario presumes that an individual has enough of the initial motivation to explore the app. User retention in these scenarios will be dependent on the application's timely ability to suggest the most relevant information and establish a sense of belonging and loyalty. Our team believes that beta testing of the application will allow GreenBeans to broaden incentives for this group of users.

Thirdly, the application can significantly assist ESD partners around the world by expanding the knowledge on social-emotional and behavioural learning dimensions of CCE. As mentioned earlier, we see the application to be a platform for testing activities and implementing change. Our deployment strategy is tightly connected to local partners and early adopters of GreenBeans. We hope that through consultations with key informants and on-ground experts, we will be able to deliver an efficient app.

3-2-2. Beneficiaries

GreenBeans will benefit young people and other stakeholders within the ESD movement. Given the fact that it is a mobile application that will be available for download free of charge. We identified critical direct and indirect beneficiaries of this application below:

Direct beneficiaries for the app will be those who use it for education – in particular children and groups who have lacked traditional educational opportunities. With over 59 per cent of the global population taking advantage of digitisation in May 2020 alone, creating an app accessible via the internet will be the most straightforward way of targeting our direct beneficiaries (Clement, 2020). Additionally, as today's youth will be faced with the impacts of climate change tomorrow, it is of the utmost importance to begin an educational process aimed at combating this hard reality. In the words of Dr Renee N Salas of Harvard Medical, “With every degree of warming, a child born today faces a future where their health and well-being will be increasingly impacted by the realities and dangers of a warmer world (Pierre-Louis, 2019).”

Indirect beneficiaries of the application is a broader swath of individuals. To begin, our group believes that through youth education and engagement, intergenerational learning will be sparked. This holds especially true in developing states where parents prioritise the education of the children. This app is also designed to utilise gamification to captivate and educate children in a way that will encourage the spread of knowledge beyond the contours of the app and stimulate sustainable practices on an individual and community level. However, our team

believes that our largest “indirect beneficiary” is the planet. By broadening access to CCE and improving engagement with future generations, our app aspires to be part of a better tomorrow focused on mitigating environmental catastrophes through education and action.

3-3. RISK ASSESSMENT

GreenBeans is an ambitious project that will require severe human and material investments. We have created this solution with the knowledge that the world remains unequal, and almost half of the population of the planet remain disconnected from the internet. As with any other technological solution, individuals outside of the mobile internet broadband will not be able to enjoy the benefits of the app directly. However, our team is convinced that this is not the reason to disregard the potential of engaging connected mobile users.

Even if GreenBeans engage only 5 per cent of 3.54 billion mobile users, we will be able to introduce CCE and potentially gain 177 million agents of change for ESD. This number surpasses ten times the target on youth engagement set by the GAP program.

3-3-1. Limited broadband infrastructure: High risk

The availability of high-performance mobile internet coverage varies from country to country. To address this challenge, we anticipate developing an application with offline capabilities. With good access to the internet, one can download a module from the education platform. Subsequent access to the platform will depend on the availability of a digital device such as a phone, tablet, or laptop.

3-3-2. Costly mobile device: High risk

We plan to capitalise on partnerships and on using results from a successful proof of concept to advocate for free or reduced internet fees for low-income groups or populations. Such arrangements exist in some countries for websites such as Wikipedia.

3-3-3. Lack of consumer readiness: Medium risk

Our solution will be available for use by individuals, civil society groups, community-based NGOs, women empowerment groups, Ministries of Education, and Academic institutions. Through these partnerships, we will integrate our solution into their existing work plan and curricula of early-adopting regions. We plan to work closely with local activists and conduct in-depth interviews to supplement our topical modelling activities. By providing them with a platform, and needed tools for climate change education, we hope to increase the number of climate change activists in communities, regions, and countries.

3-3-4. Content localisation: Medium risk

Having accessed the landscape of Climate Change Education, we will partner with multidisciplinary groups of academics, practitioners to design and deploy a relevant, actionable curriculum that meets the needs of diverse educational and cultural backgrounds. Our team will use surveys through regional partners in pilot localities and conduct.

3-3-5. Limited technical capabilities of mobile devices: Medium risk

While we will be working on designing and piloting GreenBean for smartphones, we will also be developing an optimised version of the application that will be fully functional on feature phones and low-resolution screens.

3-3-6. High user loss: Low risk

Our team suspects that at the initial beta testing stage, the app might experience high user loss due to the overwhelming number of features within GreenBeans. Our team will work to refine the application and implement new insights as quality assurance will be concluded among stakeholders.



3-4. PROGRAM IMPLEMENTATION

GreenBeans will be implemented within the span of 4 years. There will be 2 stages of the project implementation. Stage 1 “Planning and Application Development” will happen during the first 1,5 years. During which, our team will create the modules in partnership with key stakeholders of ESD for 2030, develop the beta version of the application with learning features, test it with 3 revision cycles, deploy the application in 3 pilot regions and gather analytics for further refinement of the app. This period relies largely on the ability of our team to build a strong relationship with the Network of Partners and key agencies within the United Nations (UNESCO, UNDP).

Stage 2 “Scaling and Growing” will take place next 2,5 years after the initial stage. During this period, our team will focus on information and analytics gathering to improve modules and constantly keep them up-to-date. We will be also integrating community features at this stage with potential help from potential investors and innovation enthusiasts. Scaling period will depend on ability to improve and test features fast through the network of key informants, early adopters and loyal users.

4. Moving Forward

The team believes that the application can serve as an essential tool for educators to establish mentorship relationships with students out of the class. Once created, we would like to transform GreenBeans to be a necessary toolkit with healthy and supportive communities. Moreover, we want to leverage the technology advancement in data analysis, machine learning, and natural language processing to provide a personalised learning journey, tailoring the subjects and topics to what matters the most to the users.

In the future, our group plans to add the ability for teachers to add customisable badges. This will assist educators in localising CCE to the aspects most relevant in the region of teaching. With the community-centred features, students and users will continue enjoying the knowledge and engagement from the application and even become trainers who can increase the awareness of climate change to friends and families.

Appendix: LogFrame

Stage	Description	Measure of Verification	Assumption
Goal	Improved environment	-	ESD can significantly improve state of the environment
Outcome	More people practice sustainability around the world	# who of people, who recycle; lower number of carbon emission	People are responsible for considerable emissions
	More people engage in climate action	# of people protesting for climate, # of hashtags in social media	Pressure from climate conscious population will cause states and private entities to emit less
Output	Deliver behavioral learning to at least 100,000 individuals within the first year of app operation	# of users active during the last 2 months, # of photos proving completed activities	Users are fully engage with the materials and send proof of completed activities
	Engage at least 10,000 individuals in climate action movement within 1 year of app operation	# of people claiming public participation in the app, # of hashtags to identify participation, number of times clicked in the event banner	Users actually attend public events
Activities	Conduct interviews and survey of stakeholders and Network of ESD Partners	Self reported records and videos	Stakeholders and partners in pilot localities will be engaging and open to share their knowledge, local policies will support deployment of the app
	Develop the beta version of the application	Beta version of an app	Beta version of an application will be fully functional for quality assurance testing
	Test the application, gather insights	Records of participation	Partners and stakeholders will be willing to test the app and provide honest feedback
	Deploy the application in pilot region	Application on Apple and Play Store	No barriers of access will be imposed on the application
Input	Developers		
	Partnerships		
	Material resources		

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