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Research Article

Planting a seed: Sustainable education for students with Additional Support Needs

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Keywords

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Abstract

Realities of climate change make meeting Sustainable Development Goals even more urgent, not least in terms of education. In Scotland's Curriculum for Excellence (CfE) these goals are promoted in the Learning for Sustainability initiative which aims to embed sustainability in education. While inclusion is claimed to be a non-negotiable aspect of CfE, the reality is that for many students with Additional Support Needs (ASN) (in Scottish education this term has superseded Special Educational Needs), access to a high-quality education is limited. This paper looks at a case study where urban gardening is used as a teaching tool for students with ASN. The City Works programme has grown out of nearly twenty years of work with ASN students, using urban gardening as a vehicle for developing citizenship, groupwork skills and a greater understanding of sustainability. Staff, students, and community gardeners were interviewed to ascertain their experience of the project and the value of a sustainable and inclusive education are discussed. Finally, it is argued that this educational approach should be developed further, in coordination with other educational professionals.

Highlights:

- Urban gardening as a teaching tool for neurodivergent students
- Neurodivergent students as educational ambassadors in the community
- Sustainable education through outdoor vocational practices



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The publication of the *European Journal of Geography* (EJG) (<http://europejournal.eu/>) is based on the *European Association of Geographers'* goal to make *European Geography* a worldwide reference and standard. Thus, the scope of the EJG is to publish original and innovative papers that will substantially improve, in a theoretical, conceptual or empirical way the quality of research, learning, teaching and applying geography, as well as in promoting the significance of geography as a discipline. Submissions are encouraged to have a European dimension. The *European Journal of Geography* is a peer-reviewed open access journal and is published quarterly.

1. INTRODUCTION

Global curricula recognise the need for students to become citizens capable of meeting the challenges of the future, such as the climate crisis, issues regarding migration and democracy. Garcia-Alvarez & Arias-Garcia (2022) state that “a transition is currently underway from instilling in children a sense of their own national identity to an education based on common democratic values and human rights that recognises several identities at the same time (from local to global).” Despite continuing debates regarding the value of skills versus knowledge, the need for students to gain the tools to deal with the aforementioned issues is generally accepted. These aims are taken to be at the core of Scotland’s Curriculum for Excellence (CfE) (Curriculum Review Group 2004). Implemented in 2010, CfE is considered by the Organisation for Economic Co-operation and Development (OECD) to be a “ground-breaking” “future oriented education” (OECD 2021) that aims to develop student capacities in four areas:

- Successful learners
- Confident individuals
- Responsible citizens
- Effective contributors

The OECD noted that CfE faces challenges, with tensions over a “lack of clarity in the nature” of the curriculum (OECD 2021) and a “tick box approach” (OECD 2015). Mark Priestley has raised concerns, stating that it is a “mastery curriculum dressed up in the language of a process model” (Priestley & Humes 2010), yet it is also recognised that it allows for teacher agency and collaborative teaching (Priestley, Biesta & Robinson 2013, Priestley & Biesta 2013: 3), aims which echo the notion of “curriculum making” (Lambert, Solem & Tani 2015).

The needs of students with Additional Support Needs¹ (ASN) (defined in Scotland as any student needing support whether due to disability, issues regarding language, behaviour, or access to specialist teaching) are recognised in CfE as being embedded within Learning for Sustainability (LfS). LfS was launched in 2014 in response to the United Nations Sustainable Development Goals (Higgins & Christie 2018) and to specifically integrate three areas into CfE:

- Sustainable Development
- Global Citizenship Education
- Outdoor Learning

Every student has an “entitlement” to learning for sustainability (Higgins & Christie 2018: 557) and outdoor learning is an important aspect of LfS. While recognising the challenges outdoor education presents (Higgins & Christie 2018: 559), it has the potential to meet the needs of learners who have been marginalised within the mainstream educational system (Price 2015, Kraftl 2014, Riley, Ellis, Weinstock, Tarrant & Halmond 2006).

The aim of this article is to examine the value of an outdoor educational project, specifically urban gardening, with ASN students. ASN education will be considered in the Scottish context by outlining the work done at a tertiary college in Glasgow where courses were designed for neurodiverse students and students with learning disabilities. Development of urban gardening will be considered. A case study of one group of students engaged in outdoor learning in the gardens and community gardeners will be presented, and finally, recommendations for future study will be outlined.

¹ In Scottish education, the term Additional Support Needs has superseded the more widely used “Special Educational Needs”, to recognise the broad nature of support that different students require (EIS 2019)

2. BACKGROUND

I have worked at City of Glasgow College, a tertiary college in the west of Scotland, since 2003, in the Supported Education Programmes (SEP) department. The SEP department runs three courses for ASN students:

- Transitions (student cohort ~40) for students with Asperger syndrome
- Development (student cohort ~15) for students with learning disabilities
- City Works (student cohort ~10) for students from Transitions and Development who seek a vocational alternative

The course's aim is for students to advance onto either mainstream education or work. Transitions and Development have been in operation for over twenty years, and City Works was developed in 2015 as a need for a dedicated vocational alternative was recognised for a minority of students.

While CfE promotes the idea of inclusion, the experience of students is often one in which “a deficit or medical model, continues to dominate policies and, inevitably, classroom practice” (Allan 2008). ASN students are seen as “problems” to be “managed” (Armstrong, Armstrong & Spandagou 2011) and neurodiverse students are often inappropriately placed (Lyndsay, Proulx, Scott et al 2014), leading to negative experiences of education (MacKeen 2017: 60-63).

City Works students engage in work experience in a community café and urban gardens which are set within the main college campus. This article will focus on the urban gardens.

2.1 SEP Curriculum Ethos

The SEP courses are designed to re-engage learners not well served by mainstream education. Many of the neurodiverse students have become school-phobic and have withdrawn from formal education, so it is important that they can be brought back into formal education in a safe atmosphere. As neurodivergent students struggle to understand social interaction and communication, our courses employ a “hidden curriculum” that “outlines the general standards a community holds everyone responsible for, despite the fact that most persons may not be aware of them or take them for granted” and this “is crucial for students because it contains aspects of social behaviour vital to their future success in society” (Sulaimani & Gut 2019: 32). Class sizes are kept small so that lecturers can gain trust and understanding of the student and individualise learning where appropriate. Flexibility is built into the curriculum but one area that is non-negotiable is timetabled guidance, which occurs every week and involves 1:1 discussions with the lecturer. Finally, a robust anti-bullying policy is embedded within the curriculum.

2.2 Guerrilla gardening

The use of urban gardening as a teaching tool began in 2005 with Transitions students (MacKeen 2019: 50). In anticipation of the rollout of CfE, FE colleges recognised the importance of citizenship education, and I was asked to teach Citizenship as part of the course. Neither the students nor myself felt that the materials provided were particularly enlightening, and as neurodiverse students benefit from concrete activities, I chose to focus on earlier discussions regarding the local neighbourhood. At this point we were located in the Gorbals, a working-class neighbourhood of multiple deprivation south of the River Clyde, which was not well served by the local authority. Students often complained about littering in the area, so with the aim of introducing the concept of active citizenship, we began regular litter picks. This created space for discussions about the “right to the city” (Harvey 2003) which were obviously of a geographical nature. The students often argued that the city council should do this work, but I posed the question: if we don't do it, who will? This work then led to our first

foray into guerrilla gardening, and establishing a vegetable garden which continues to this day.

Figure 1. Gorbals garden (photograph by D. MacKeen, Glasgow, 2006)



2.3 Rooftop gardens

After a merger of three colleges, CoGC moved into a new building in the central business district in 2016. Two rooftop spaces were designed for gardening, one with raised beds on the fourth floor (Figure 2) and another with a larger space on the seventh floor (Figure 3). The seventh floor garden was developed into an orchard with heritage fruit trees. Students from Transitions, Development and City Works were involved in the development of these spaces. These spaces are now used as outdoor learning spaces by these students, primarily City Works. Students participated in the design and maintenance of the spaces, and the produce which is harvested is supplied to the College's catering department.

Figure 2. Fourth floor rooftop garden (photograph by D. MacKeen, Glasgow, 2022)



Figure 3. Seventh floor rooftop garden (photograph by D. MacKeen, Glasgow, 2022)



2.4 Vocational Capabilities

The City Works course was developed as a vocational alternative for a minority of Transitions and Development students. While most SEP students move on to courses in the college (or to other colleges), the need for a work-oriented educational alternatives was recognised.

The course was designed with the particular differences of the students in mind. Therefore, a Capabilities Approach (CA) was employed that considered the need for students to not only think about future work opportunities but developing a “more fulfilling life” (Terzi 2005: 6). Developed from the work of the welfare economist Amartya Sen and the philosopher Martha Nussbaum, CA seeks to “counter the utilitarian view of welfare economics” and recognize the importance of human agency (MacKeen 2017: 25). To develop their capabilities, people must be able to meet needs *and* wants (“functionings”) which can lead to “human empowerment” (Lambert et al 2015: 724, emphasis in text).

In terms of the horticultural part of the course, powerful knowledge regarding sustainability was integral to the curriculum. The curriculum of City Works emphasised that the horticultural work was not simply an opportunity to learn vocational skills but to develop a deeper understanding of the need for sustainable horticulture. As one lecturer (Participant 9) noted, students were able “to apply their own problem solving skills and initiative in the gardens. They could identify and remove annual and perennial weeds, they understood the importance of sustainable practices, and organic principles.”

The relationship between student and teaching staff on SEP courses meant that there was a more participatory ethos, which allowed students to develop their agency. Participant 9 (lecturer) found that by the third term the students “could work on their own initiative and in a cooperative manner” and that they “were more a team of equals than teacher and students.” In contrast to standard vocational approaches, “...which emphasise economic growth and income generation as key development objectives with employability and the creation of human capital...the capability approach emphasises human flourishing, with economic growth seen as a necessary but not sufficient means to achieve development.” (Powell & McGrath 2014: 11).

2.4.1 Eco-Capabilities

The Eco-Capabilities project (Walshe, Moula & Lee 2022) is designed to engage students with the arts, to develop their well-being through a connection with the environment. The project uses CA to allow the students to develop their agency to gain empowerment and determine their future. The project allowed students to connect with and gain a greater understanding of nature through outdoor art education, and in contrast to standard teaching about sustainability “that imposes the responsibility of saving the world on children”, the Eco-Capabilities approach “could serve to provide a more gentle and empowering way to engage children with issues of environmental sustainability.” (Walshe, Moula & Lee 2022: 20). While specifically an arts based approach, Eco-Capabilities offers valuable insights in using a CA approach, particularly as many of its findings mirror those of this study. This will be discussed in more detail in Section 5.

2.5 Assessment Materials

Assessment materials have been developed for the City Works course to meet the particular needs of the students. The students undertake a National Progression Award (NPA) in Horticulture at Level 4 of the Scottish Credit and Qualifications Framework (SCQF).

The design of the assessment materials considers the range of different approaches necessary for successful engagement. As there are a variety of neurodivergent students on City Works the materials are presented in a straightforward manner and employ visualisation when appropriate (See Figures 4 and 5).

The students worked in both practical gardening and classroom sessions. The classroom sessions provided the theoretical portion of the learning and the gardening sessions were hands-on opportunities to turn theory into practice. However, the line between theory and practice was not absolute and there were many opportunities to gain theoretical knowledge in the garden space, such as the sessions on soil, which allowed the students to gain a deeper understanding of the nutrient cycle.

Online materials were designed for students who could use computers, while those who could not were able to work with the lecturer directly. These materials were also used in whole classroom settings so that the entire group could gain an understanding of the materials. The course materials emphasised the importance of sustainability (see Figure 5), so that the students could move beyond a superficial understanding of the issue. While City Works is not a geographical course, Maude's (2016) typology was helpful in considering the sort of powerful knowledge that informs the theoretical portion of horticultural learning. To develop the student's understanding of the issue of sustainability, the issue of place, particularly that of a garden within an urban area, was important. Discussions about how cities function, for whom, and how citizens can gain control of and manage their cities through sustainable, organic gardening were essential in allowing the students to make the connection between theory and practice. This helped the students to gain "new ways of thinking about the world" (Type 1) and the lessons on the importance of the nutrient cycle for soil helped them "analyse, explain and understand the world" (Type 2).

Figure 4. Assessment materials, with examples of suitable responses

Soft Landscaping H1XB 10

Outcome 1

Identify the following tools and equipment used in soft landscaping and give the use and the personal protective equipment (PPE) required when using each one.

Tool/equipment	Name	Use	PPE required
	Brush	Sweeping hard paths and surfaces	Gloves to protect hands from splinters
	Shovel	Move large amounts of debris, gravel or soil from one area to another	Steel toe cap boots to protect feet.

Figure 5. Online learning materials

What's in it for me...and the planet ?

Read This

Sustainability

What does this mean? People talk a lot about sustainability, especially with regard to Climate Change. We are using up too much of the planet's natural resources, destroying the forests and the rivers, and pumping pollution into the air. How can we feed the growing world population without destroying the planet? It can become too overwhelming to think about how we can change this, but in real terms there are lots of small things that we can do to help make a big difference. At an individual level we can recycle and reuse the things we buy, and we can help nature by growing our own food in a way that does not damage the environment. Our gardens are organic. That means we use no chemicals or pesticides. We use only natural fertilisers such as seaweed or fish, blood and bone. We plant insect friendly native plants wherever possible to encourage bees and other pollinators. We use watering cans rather than hoses to reduce the amount of water we need and we compost our plant waste. We grow all our crops from seed.

Our food crops go to the College Kitchens for use in the Culinary department, so our crops are grown, processed and eaten on the premises! Any food waste in the college can be processed in The Rocket Composter and turned into nutritious compost for the garden. As we collect seed from our plants, we are aiming to become as self sufficient as possible. Have a look at the video below to find out more about how we can create more sustainable ways of food production.



Watch Videos - The future of food production ?



It is clear that we need to change our outlook in terms of how we produce food. The examples in the video show that you can start small and become influential through success. Our City Garden can demonstrate that you can grow food in Urban areas. Just imagine if every building had to have a garden instead of a car park? During WW2, every available foot of land was used for food production. Most people who had any kind of outdoor space grew their own fruit and veg, because they couldn't get it any other way. For people living in places where outdoor space was limited, the allotment proved a big success. These still continue today and are proving so popular that there are usually waiting lists to get one.

Our college gardens provide us with the opportunity to grow a range of fruit and veg crops and do our bit towards sustainability. In the next section you will see how to do this safely.

3. METHODOLOGY

For this small-scale research I have used an interpretive research design, which allows for a vision of research as a process of “moving continuously forward with a question, to which there was no perfect answer” (O’Keefe 2021: 49). This paradigm “views the world as open to interpretation” (Shambrook & MacKeen 2021: 13) and “interpretive researchers see their analysis as a matter of providing an understanding rather than providing something that is an objective, universal truth” (Denscombe 2014: 236). This paradigm is particularly useful when engaging with ASN students, who may find it difficult to articulate their thoughts and feelings. A degree of trust is essential (Bhattacharjee 2012) for the participants to feel confident in speaking to the researcher. All the participants have worked with me and developed trust and rapport, which helps to destress the situation. It is also vital that power relationships are acknowledged (Bernstein 1974) and further the researcher must be aware of their own “social background, likes and dislikes, preferences and predilections, political affiliations, class, gender and ethnicity”. (Thomas 2013:109).

3.1. Ethical Considerations

It is of vital importance that research with ASN students is conducted according to all ethical protocols, including informed consent and anonymisation of participants. Due to our small class sizes and timetabled guidance, we are also able to develop and maintain relationships with the students that allow for informed consent with this group of students (Cameron and Murphy 2007).

3.2. Recruitment

The participants were recruited from the students (9) and staff (3) of the City Works programme. As one staff member also has ongoing relationships with urban gardens in the city, it was decided to include community gardeners as well to investigate the value of education in their work.

3.3 Questionnaire

A questionnaire was distributed to the students, using Google Forms. The questionnaire was designed to be easy to understand (Denscombe 2014: 166-7) and aimed to capture student's attitudes as opposed to trying to influence them.

3.4. Semi-structured interviews

Semi-structured interviews have been shown to be a successful way of gathering information from neurodiverse people (Krogh and Lindsay, 1999). As neurodiverse people often have difficulties in terms of processing information (Cridland, Caputi and Magee, 2015) it is important for the interviewer to be able to go back and check for understanding, re-word questions if necessary and follow what may at first seem tangential information. A low arousal, non-judgmental approach is helpful, to create a less stressful atmosphere (Thomas, 2013). Six open-ended, non-biased questions were used (Charmaz, 2006) (see Table 1).

Table 1. Interview Questions

1. How long have you been involved (in the course/project)?
2. What do you understand now that you didn't before (you started the course/project)?
3. How has it benefitted you?
4. Do you think it has benefitted others?
5. What skills have you gained?
6. What do you think the future will be like?

3.5 Data Analysis

Braun and Clarke's thematic analysis (2006) was implemented. Themes were created from the accumulated data. The themes developed from the responses, and not from a particular theoretical basis. While similar to grounded theory, it differs in not relying on a theoretical/epistemological basis. It was important to let the data "speak for itself" in order to allow the meaning of the participants' views to be unencumbered by any predetermined goals or biases of the researcher.

4. FINDINGS

Responses from the questionnaires and the interviews will be presented here.

4.1. Themes

Themes developed from the interviewee's responses and can be seen in Table 2 below.

Table 2. Themes

Practical work	• Concrete • Physical
Learning	• Skills • Knowledge • Interpersonal
Confidence	• Gains for students from social interaction • Surpassing expectations of what they thought they could achieve
Community	• Tool for organising • Increasing understanding of each other
Imagining the future	• Apprehension from many students • Concerns regarding institutional structures • Optimism about what is possible

4.1.1. Practical work

Necessity of practical work was a key theme among the respondents. The concrete nature of the work was seen as appealing to a wide range of participants, particularly those who often struggle to understand abstract concepts.

“In the practical realm, working in the gardens, it's got a beginning, a middle, and an end, the tasks are practical, there's a rhythm to it, a cycle to it. The students understand what it is. It's very concrete, so it appeals to a lot of neurodiverse people” Participant 9, Lecturer

The physical nature of the work also emerged as an important factor in the success of the course.

“I feel a lot happier, and doing the gardening and going outside instead of writing. Something physical instead of having to write more.” Participant 4, student

“[The students] see themselves in a different light. They can actually be quite a physical person who...is capable of a lot more than they've ever done before, or maybe they were embarrassed to try it before... They may have some leadership qualities they didn't know they have, because that's not the role they seen themselves in...And it's often a gateway...because a lot of times when you're doing gardening and it is quite physical and you have to do it collaboratively...somebody has to hold the bag, the other person has to shovel the dirt in, so you're both in the same space and...people end up talking to people that they may not have talked to before in the class and...sometimes they end up becoming friends. I've seen that quite a few times. It's a good way to get people to socialize unconsciously and it makes it a lot more stress-free. It's not forced.” Participant 11, classroom assistant

“One student really struggled due to dyspraxia, but his peers suggested he make a big red dot where he was to drill and this helped considerably...All students were fully

independent in this by the end of the term. One student still required supervision.”
Participant 9, lecturer

4.1.2. Learning

For both teaching staff and students, the learning process was described as dynamic and robust. Most questionnaire respondents rated the course highly.

The course allowed teaching staff to develop a process in which a dynamic remained between them and the students.

“I learn all the time from the students. And I think it’s a continual loop, so it’s benefited me because it keeps my ideas vibrant and I come away feeling quite energized.”
Participant 10, Lecturer

Many of the students have struggled with aspects of academic learning and the work in the garden has provided them with opportunities to improve their abilities, particularly through the NPA in Horticulture. The garden becomes a vehicle for expanding student learning.

“It’s helped me more about learning a lot. I couldn’t read and write and spell and that’s why I wanted to learn more.” Participant 7, student

ASN students who come on to SEP courses have often had particular challenges in mainstream education, often stemming from their own issues (e.g. processing difficulties) and external issues (such as bullying) (MacKeen 2017: 14). Specialists working with these students need to be aware of these challenges and sensitively anticipate the difficulties these issues cause for student learning. Outdoor learning can provide a space that does not have the negative associations of the traditional classroom.

“I think it’s really good to...be patient and let people find their feet with outdoor learning because a lot of times it’s the first time that...they’re doing physical things and they don’t see themselves in that way, but if you let them do it and take their time with it, they can see themselves in a different light, because sometimes they’re actually really good at these things and it’s just a different way of seeing themselves. And that’s, that’s really good to see, and I think it’s a really good learning outcome.” Participant 11, classroom assistant

There is scope for bringing learning out of traditional educational institutions and into communities. For instance, Yorkhill Greenspaces has a member who is an entomologist, and working with local schoolchildren they have identified 1100 new species of insects. The learning process for this group is ongoing and creates an important connection between the learner and the community:

“The actual gardening side, and the planting side, biodiversity and all of that side of that is all just been me learning all of that cos it wasn’t something that I was ever – I did pottering about in the garden and in fact when I went along to that first meeting...I was thinking I was gonna learn a wee bit about it. But I think with all these things you need to have lots of different skills. So there are people who are expert gardeners, social media. So we’ve all got our role to play.” Participant 12, Yorkhill Greenspaces

Figure 6. Outdoor learning class on soil, 4th floor garden (photograph by D. MacKeen, Glasgow, 2022)



4.1.3. Confidence

The City Works students spoke of an increase in confidence.

“I don't really like to go outside much, you know. Cos in high school everyone went outside and communicated, I was never really that kind of person, so this course kind of, you know, gives me a bit more skills in speaking to people and making friends and contacts.” Participant 6, student

This increase in confidence was noted by the teaching staff:

“Initially, no one had any belief that they could make anything, or any idea of how to go about it. They lacked physical confidence, some due to dyspraxic type difficulty, but the majority because they had no experience of using their physical body other than for day to day living. Most of the group were not ‘allowed’ to take part in activities that

parents/carers felt were too challenging, so expectations of their capabilities were very low.” Participant 9, lecturer

The importance of this rise in confidence cannot be overstated in terms of ASN students and it is important to note the nature of their own understanding of themselves:

“[Gardening] can give you confidence. It can bring out skills that you didn't know you had and it can...turn you from a consumer to producer.” Participant 11, classroom assistant

This growth of understanding of oneself was also noted by community gardeners, who all spoke of having to take on new challenges (e.g., organising groups, using technology to maintain accounts, developing skills in horticulture) which they had not imagined they were capable of before they became involved.

Figure 7. Students using student-designed compost sifter (photograph by D. MacKeen, Glasgow, 2022)



4.1.4. Community

Staff noted that students became engaged with each other in meaningful ways through practical tasks, which helped alleviate much of the social anxiety that the traditional classroom had often entrenched.

“It takes away some of the anxieties of social situations because you're doing things. Conversation can come a lot more naturally and you...have to work together. So conversation usually comes out of that and friendships too.” Participant 11, classroom assistant

For community gardeners, the garden spaces became a vehicle for social interaction that was not happening normally.

“We had an event a few weeks ago there, up at Yorkhill Park, and with all our events anyone can pop in and join us. There were two students who were Chinese students and they never had the opportunity, they've been here for two years, most of their stuff is done online, they're living in residencies and they never had a chance to meet, talk to anyone in the community.” Participant 12, Yorkhill Green Spaces

Important connections between individuals within their own communities developed from these interactions and highlight potential difficulties when these connections are not developed.

“But I think there's all the other things that happen, the relationships, the friendships, and the...learning as well, that people learn from each other. And then I was thinking about it...one of the group had, COVID...a few months ago and his flatmate wasn't around. So he was kind of totally on his own and he had nobody else, but we've got...a WhatsApp group, and everyone was...going around and taking things around and making sure... and then another one in the group said to me, like...if nothing else good comes of this, I've met [this person] through that now.” Participant 13, Anderston Green Spaces

“It's not just one person that benefits out of it, it's everybody that comes.” Participant 14, G3 Growers

4.1.5. Imagining the future

An important aspect of active citizenship is the ability to recognise one's own agency. Therefore it is vital that individuals, particularly marginalised people such as ASN students, see their own ability to create positive change. However, many students found it difficult to articulate how they think the future will be. From the questionnaires, half of the respondents felt they could change things for the better and half did not. In the questionnaire, one student commented “Having new skills and increased knowledge empowers me to use for work opportunities and leisure”, while another stated “I don't think I could change things because not a lot of people listen and don't think I have the courage to change anything.” Doubts were also felt by another student in an interview:

“I'm a very cynical person so I don't really see my future being that good. I need [National] 5 English but I never was very good at English, everyone was going ahead of me, I was the one stuck behind cos I'm a slow learner when it comes to English and so I don't really see my future as being nice. I would like my job to be creative. I'm a lazy person and more so since Covid happened and the only thing I find passion in is

in creativity. I would need to go somewhere to do that cos in my house I'm way too comfortable." Participant 6, City Works student

The course material on sustainability had a noticeable effect on the students' views of the possibility of change. Participant 9 (lecturer) noted that "[s]tudents who initially had no views on climate change, were now able to talk about what might happen, and what they could do as an individual. Some argued that things wouldn't change, but this was progress from an initial shrug of the shoulders and 'who cares'."

City Works staff believed in the possibilities for a positive future but were concerned about the barriers created by neoliberalism:

"And I'd like to think that in the future we'll still recognize that everybody has an important part to play despite what their background is...I'm not sure because I feel there's still this...kind of push towards valuing things over people rather than people over things." Participant 10, Lecturer

"I think [the future] has the potential to be really good if people are allowed to reach their potential. But I think sometimes that's stymied by...like sort of corporate things don't see the big picture and they kind of...instead of letting things progress sometimes put a stop to it because it's...a way of ... normal people getting together and seeing solutions that don't involve big business. And...I think sometimes when that's seen and they're alerted to it you know they can put an end to it. I think people do have a lot of potential, especially when they get together and there's...lots of things that could change. It could change for the better and especially concerning... climate change...but people have to be allowed to do it and there needs to be more freedom to do it." Participant 11, classroom assistant

Community gardeners were optimistic about the possibilities for bringing communities together to effect change:

"When we had the COP26, just seeing all the young people, how much more aware they were than our age group. So I feel really hopeful that the Council and various bodies are looking at the importance of it. So there's funding available, there is learning available and things like that so I think the fact that it's been recognised as a necessity." Participant 12, Yorkhill Growers

5. DISCUSSION AND CONCLUSIONS

This article aimed to assess the value of urban gardening as a teaching tool for ASN students and the wider community. For ASN students, innovative solutions are needed to re-engage their interest in education. The students involved in City Works have found the course valuable in terms of their educational growth and their understanding of themselves. The combination of practical work, formal and informal education provides a meaningful pathway for students who have been marginalised and less successful in mainstream education. It also shows potential as a way to engage the wider community in an educational project that could further the issue of social justice.

5.1 Spatial Justice

The issue of spatial justice arises from the use of urban gardening. For marginalised groups like ASN students, their experience of space is mediated by their "disability". Gleeson (1999: 18-24) notes that while the "social model" of disability (which views disability as a result of a society that is "constructed by and in the interests of non-impaired people") is now claimed to be the dominant view, as opposed to the "medical model" (which views disability as due to the

individual's lack of "normality"), it is the medical model which holds sway over "official definitions". In contrast to both the medical and social models, Gleeson (1999: 24-27) proposes an historical-materialist model which sees disability as a form of "oppression" caused by capitalism that "[structures] the social understanding and experience of impairment".

For the wider community, the issue of spatial justice is one of access and ownership. Cities like Glasgow have witnessed a "post-industrial" turn that has seen "regeneration" since the post World War II period. After the war, Glasgow faced a crisis of over-crowding, with many residents living in poor-quality tenements (Wright 2021: 977), in an atmosphere of economic decline (Fyfe 1996: 389). In response, urban planners used a program of "creative destruction" (Fyfe 1996: 387), resulting in the displacements of communities.

Urban agriculture has become a vehicle for community organising and the reclamation of space (Certoma, Sondermann & Noori 2019, MacKeen 2011). There is a danger of urban agriculture becoming co-opted by neoliberal aims (van Holstein 2020), leading to a "privatisation of the urban realm" (Tornaghi 2014:553), as noted by one community gardener:

"There are initiatives in the council where they are keen to be supporting free spaces and green space work. It sort of annoys me that...they do...because it takes the burden off them. And they're not actually doing the job that they should be doing." Participant 13, Anderston Green Spaces

However, for participants who are aware of these challenges it poses a viable mode of community engagement. It can become a way of reimagining the city on the terms of the people living in it, bringing together networks of people exercising a "right to the city" (Soja 2014: 244). Its potential can be hampered however by negative perceptions (Eizenberg 2019: 162), and the development of an educational approach could create a valuable corrective.

5.2 Educational challenges and opportunities

In Scotland, the educational strategies offered to ASN students tend to emphasise inclusive settings, with questionable success (Lyndsay, Proulx, Scott et al 2014), and high levels of anxiety, especially for neurodiverse students (Sciutto, Richwine, Mentrakoski & Niedzwiecki 2012). Programs to transition students into mainstream settings that rely on social skills training can be successful (Lawrence 2010) but it is important to note that students sometimes find this approach less than engaging (Barnhill 2014: 10).

Lecturers on City Works noted that the expectations of students were often lowered by a reluctance to be challenged and that this was often reinforced by institutions.

However, the clear rise in confidence for students who have been challenged to see themselves in a different way, being physical and working collaboratively, points to educational opportunities for ASN education.

"Not everybody who works in the garden is going to end up with a career in gardening, but it's sort of planting the seed. And they may come back to it even later in life." Participant 11, classroom assistant

The Eco-Capabilities project also noted a rise in confidence, which they termed "autonomy". The authors noted that the rise in confidence "seemed particularly acute for some children who found it more challenging to actively participate in traditional classroom environments". A teacher noted that students who "aren't as academically astute as others, and would struggle..." now "absolutely flourish". (Walshe, Moula & Lee 2022: 9). The project also noted a rise in relatedness between students and the natural environment. There was a rise of "ownership" of the garden spaces "which was vital in increasing children's autonomy and agency" which led to a "pro-environmental identity" (Walshe, Moula & Lee: 18). This echoes our findings, and points to a potentially rich educational alternative for neurodivergent students and others have struggled with traditional classroom settings.

Furthermore, if links are made between these marginalised students and community gardening groups, a new educational paradigm appears, one in which barriers such as that between formal and informal education can be reduced. The understanding of the need to learn about and tackle the climate crisis, for instance, can move from classrooms to community gardens and from there to the wider community in which these spaces are situated. If a more formal geographical approach became part of the City Works curriculum, perhaps these students could become educational ambassadors to community gardens.

5.3 Recommendations

In order to further develop the possibilities of this educational model, several recommendations follow.

Firstly, it is important to recognise the value of outdoor education in confidence building. This is obviously important for ASN students but the potential use as a community building tool is also promising. The opportunity for informal learning allows for activities such as urban gardening to be a vehicle for education and this can mean that individuals who have had negative associations with more formal institutional arrangements could be less resistant. Finally, as we are still dealing with the COVID-19 pandemic, outdoor education offers the possibility of a safer “classroom” which could mean less interruption to the learning process. While recognising the usefulness of informal learning to re-engage disaffected learners, it is important to seek out opportunities to bring in powerful disciplinary knowledge (PDK), and the PDK of geography would appear to fit in well with outdoor education in general and urban gardening in particular. As humanity struggles with the climate crisis, and innovative solutions for problems of food insecurity are sought, a more robust geographical knowledge poses the possibility of an empowering learning experience. Furthermore, in an earlier small scale research project, it was found that students became more positive about the future and their ability to change it after having gained geographical knowledge (MacKeen 2019, MacKeen 2017: 74). It is therefore worthwhile investigating if geographical knowledge would improve this feature of the City Works student experience.

Students armed with this knowledge, as well as their understanding of urban gardening, could serve as useful educational ambassadors for community gardeners, and this in turn could help break down barriers between these two groups, ideally reducing prejudices on both sides and increasing relatedness. The learning developed between both could then be shared with the wider community, via open days, presentations, videos and social media.

Finally, it is proposed that this work is further developed with educators, geographers and ASN specialists. Research projects involving all of these stakeholders could be organised in order to determine how outdoor learning, informal learning and the PDK of geography could be used with a variety of different groups in order to increase understanding of the climate crisis, urban issues and to improve relationships between individuals within communities, through a deeper understanding of these vital issues.

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