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# Everyone Can Grow! Winter Programming Using an Indoor Horticulture Environmental Education Program to Benefit Military Veterans

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# Everyone Can Grow!

## Winter Programming Using an Indoor Horticultural Environmental Education Program to Benefit Military Veterans

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**Master's Field Project**

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**ABSTRACT**

Working with plants has numerous physical, mental health and well-being benefits for people, and military veteran farming programs have been started to provide these benefits. However, these programs lack activities outside of the Washington State growing season which is approximately May to October. Since these programs are largely meant as ways for veterans to engage in community and peer support, the gap over winter is unacceptable for the purposes of supporting mental health. This project produced a winter environmental education curriculum for military vets, titled *Everyone can Grow!* (*ECG!*), and is designed to provide peer support and psychological benefit from nurturing indoor plants. Its 40 lessons in 4 modules cover botany, plant care, building and maintaining vivariums and terrariums, and various artistic projects. These lessons are collectively ways to learn concepts of ecology and stewardship and related practical skills, for the purposes of encouraging environmental stewardship. The group format of the lessons provides veteran peer support. Plants are also provided for students to take home and extend the psychological and other benefits into participants' daily lives. Three two-hour lessons from *ECG!* were piloted on separate Wednesdays in November 2018 at the Western Washington University (WWU) campus. Although participation was low, formative evaluation results were encouraging. These results led to a second pilot conducted at the Bellingham Veterans Center. At the time of this writing, the secondary pilot has conducted its first class and is negotiating support for continued classes at the location. Stronger outreach and publicity are being employed to increase participation at the Vet Center.

*Keywords*: environmental education, military veterans, peer support, garden, terminology, plant, disability, mental health, vivarium, terrarium, ecosystem, environment, indoor, activity, support, botany, ecology, aquarium, hydroponic, aquaponic, art, therapy,

therapeutic, horticulture therapy, arts and crafts, hobby, monograph, journal, pest, disease, insect, isopod, worm, cricket, cockroach, springtail, bioactive, oyster mushroom, sprout, microgreens, mycology, plant care, soil, farm, agriculture

## INTRODUCTION


This study is about the intersection of environmental education and caring for plants to support the mental and physical health of disabled military veteran populations. Why this population was chosen is due to an increase in the presence of disability and increased need for mental health support. I will review relevant literatures throughout this paper then add context on how it applies. I will weave my project concept into the review so that the research bases and nature of the study emerge together. Then I will explore examples, such as local veteran farming programs and indoor gardening trends as well as how other ideas have informed my study and the set of activity plans and background that are the applied part of my project.

Environmental education (EE) can include a plethora of subjects relating to the understanding and stewardship of the environment. The main principles of environmental education are awareness, attitude, and action. Awareness is increased by any activity or lesson that improves a person's understanding of environmental issues. Attitude combines beliefs about a topic with an evaluative attitude toward it (like/dislike; care about/indifference). Sometimes attitude changes with awareness, for example knowledge may inspire people positively towards environmental stewardship (Fig. 1). In other circumstances, directly changing behavior can

change attitude, and through that change knowledge-seeking and awareness. Although the awareness>attitude>behavior pattern has been very widely criticized, knowledge is still a foundational principle to self-change. According to Eusden (2011), sometimes what is needed is not knowledge itself, but how to make a change. For example, by developing indoor gardening knowledge and skills, it may help students more easily conceptualize larger environmental issues while developing skills that can then be used to support those larger issues. As the saying goes, "how you act at home is how you act in public". Therefore, the practical application of education can be diverse.

Several of these methods that have been popular in EE include outdoor recreation, and food- or plant-based programs like farming and gardening. Such programs help people experientially understand and value ecological interdependence and also provide health benefits. However, these tend to represent physically and mentally demanding activities. For those with disabilities these activities are less accessible and less inclusive due to personal limitations. Unfortunately, when people become disabled or have disabilities, it can lead some to become isolated due to limitations or feel like they must isolate themselves, compounding the loss when activities are inaccessible (Hanson, 1970). To combat this, bringing some of the farming activities indoors, where applicable, can increase participation in EE undertakings and subsequently increase the therapeutic value of such programs.

Populations such as U.S. military veterans have a higher percentage of disabilities when compared to other populations. Veterans are also 1.5 times as likely to commit suicide (Department of Veteran Affairs, 2016), indicating higher mental health challenges. For disabled veterans, indoor activities could be a way to increase their access to community- and mentally-beneficial activities through adapted facilities and programs that run throughout the year instead

of seasonally. To explore this potential, this research models itself after veteran farming programs. It emphasizes the psychological benefits of plant-related projects on post-traumatic symptoms such as isolation and loneliness, depression and anxiety, and chronic pain. It also includes a broader spectrum of perceived benefits, such as relaxation and a sense of fun.

Currently, plant-based programs for military veterans focus on building skills for veterans to start and manage farms (Flemming, 2015). There are also farming programs that allow veterans to volunteer time to help manage local farms and in return they gain skills and help a good cause, such as donating crops to a food bank. Both options tend to require good mobility and strength. For many veterans, this is acceptable and fits with their previously active lifestyle. However, for veterans who have lost mobility and strength through various forms of injury, trauma or disease, these programs are inaccessible to them, and for those with both mental and physical issues, it might be entirely inconceivable to participate.

Therefore, the spectrum of military veteran plant-based programs must be broadened, to allow for fully accessible and inclusive year-round programs with multiple skill levels to accommodate the variety of veterans who wish to participate. The practical application could be as simple as adding an indoor based winter curriculum that allows for continuous learning about farming. But farming is not the only way people learn and benefit from working with plants. Thus, programs could also include caring for other types of plants such as ornamental indoor plants and miniature ecosystems such as terrariums and vivariums. In this way, all veterans, regardless of skill level or interest in starting their own farms could find a place in military veteran farming or other plant-based programs.

## THE RELATIONSHIP BETWEEN PLANTS AND PEOPLE

Live plants have touched almost every facet of human existence, from providing for people's nutritional needs via foraging and farming, to being used as air purifiers, flood-mitigators, and heat-reducers in cities, as well as barriers from wind or for privacy. Keeping living plants in homes and businesses also has the side-effect of being psychologically comforting to those in their proximity. Tending to plants can have many psychological benefits which will be explored below.

Although there seems to be a belief that "nature" necessarily implies "outdoors," a literature review by Bringslimark, Hartig, & Patil (2009) of 21 research articles found that there are positive psychological benefits of having plants indoors. They defined positive psychological benefits as any positive change in cognition, emotion, or physiology as well as increases in adaptive capacity and effectiveness. They also considered increases in social interaction, reductions in pain, and reductions of symptoms of poor health, positive psychological benefits. Their review found that these are benefits to having plants within visual range. They concluded, however, that there was not enough research to generalize due to the heterogeneity of the articles reviewed.

Some scientific research on the benefits of plants focuses on increasing office workers attention or other benefits to increasing productivity in a workspace. According to Lohr (2010), people in an office setting are more productive in the presence of plants when compared to not having plants in their offices. Participants in the study also claimed that they felt calmer with plants present than without. Lohr, Pearson-Mims, & Goodwin (1996) found that people are more tolerant to pain and generally feel less discomfort when plants are present in windowless workspaces. Raanaas et al (2011) also found that having plants near work spaces increases focus

and attention capacity. A study done on plants in large shopping centers found that plants reduced the stress of shoppers and increased the pleasure of the shopping experience, particularly when store interiors were complex (Brengman, Willems, & Joye, 2012). According to Park and Mattson (2009), hospitals use plants to increase the rate of healing in post-operative patients. In their study on 90 patients recovering from hemorrhoidectomies, they found that, controlling for other factors, patients with plants and flowers in their rooms were more satisfied with their care and rated their rooms as more appealing. They also had lower systolic blood pressure, and reported lower ratings of pain, anxiety, and fatigue. These reactions to plants are not exclusive to places outside of the home. Therefore, it is reasonable to generalize that having indoor plants in less stressful situations such as at home will elicit the same types of effects.

Plants also have an exceptional capacity to act as living air filters, as explored by NASA in early work on space station air quality (Wolverton, 1989). According to Dela Cruz, Christensen, Thomsen, & Müller (2014), plants can filter up to 59 different volatile compounds from the air, including carbon monoxide and formaldehyde. According to Borkan (2015) and Tomlinson (2018), plants filter the toxins from cigarette smoke, although the tar can build up and clog the stomata of plant leaves, so there is evidence that there is a limit on how much cigarette smoke plants can filter properly. This natural filtration may also include other types of fine particulate matter. Besides obvious effects on lung and overall health, as a side effect of cleaner air, some claim that plants improve sleep (Leonard, 2015). Other benefits of keeping indoor plants are reduction in air temperature through plants' ability to absorb and deflect heat, balancing humidity through leaf transpiration, and a decrease in dust through the production of negative ions that cling to particles in the air and cause them to clump and fall (Borkan,

2015; Tomlinson, 2018). There are likely many more benefits to keeping plants indoors that have not yet been explored.

With so many positive benefits, it would be a shame to ignore any opportunity to include more people in the knowledge of their benefits and care.

One of the theories for why people have positive psychological and physiological reactions to plants is Ulrich et al.'s (1991) evolutionary theory emphasizing stress reduction. Lohr (2010) also linked humans' instinctual sense of survival to comfort around plants. This is to say that humans subconsciously see areas rich with plants as safe and fertile. The idea is that an instinctual place in the human psyche stems from the co-evolution of humans with plants. This is also like Wilson's (1986) theory of biophilia. However, instead of linking positive attitudes towards plants and nature with subconscious instinct, Wilson theorized that people have positive reactions to plants because of a general innate tendency to focus on life and life-like processes. An alternate theory is the Attention Restoration Theory of Kaplan & Kaplan (1989) further refined by Hartig, Mang, and Evans (1991), These psychologists hold that "nature" requires less effortful attention than many things in modern life and captures involuntary attention which allows a restorative break for focused attention. This makes viewing or being around plants and animals less mentally exhausting or energy consuming than being around manmade objects, structures, etc.

To continue the exploration of the multi-faceted links between plants and people, the modern relationships must be discerned. It is important to research a general understanding of the indoor gardening market and social interest in growing plants indoors. This way, the timeliness of this program can be assessed and inferences can be made about the receptivity of people to this type of programming.

Unnamed authors on the website Garden 365 (2017), cite that an indoor gardening market trend began around 2007. They explain that as less plants and natural spaces are available outdoors, including greater urbanization and many people lacking yards and other spaces for outdoor gardens, more people are turning to growing plants indoors. Garden 365 (2017) also claims this shows some connection to keeping plants and a perceived improvement to living spaces or life in general. They report that the indoor gardening market grew 8.2% from 2010 to 2015. Gardening stores made just under a billion dollars in 2015. They claim this increase is due to a trend in healthy eating pushing a demand for healthy living, i.e. keeping plants indoors for health reasons (Garden 365, 2017). This raises an interesting question about possible placebo effects in plant keeping if people are keeping plants due to a belief that it will have a positive effect on their overall health. This increasing attention towards growing plants indoors has continued to the present.

Interestingly, there are also countless editorial articles and blogs that make claims about the reasons keeping houseplants has increased in popularity in recent generations. These ideas support the concept that indoor plant keeping may be linked to either social conditioning or other subconscious effects to some degree. For example, Gander (2017) claims the rising trend in keeping houseplants is due to either an actual or perceived lack of ability to afford a house or children, which suggests plants may offer a type of coping mechanism that allows people to gain a feeling of control over their lives. Another idea is that plants are used as a guilt-free alternative to pets because plants can be composted and replaced should they die (Pesce, 2018). There may be some significance to this, as there has also been a recent trend of people giving names to their plants just as people would with pets (Gander, 2017). However, this rise in the popularity of keeping houseplants may also be due in part to social modelling, since many people who keep

plants also post their indoor gardens on social media sites such as Instagram or Pinterest and may reflect a new trend in interior design (Pesce, 2018). Nevertheless, without good data, strong research designs and statistical analysis, it is difficult to determine the validity of these ideas.

The reasons that humans are attracted to plants may also be individual and vary depending on the person. More research is needed to come to a definitive answer of why humans have such positive reactions to the presence of plants. There is, however, a well-researched connection between attenuated physiological stress response levels, psychological comfort, and the presence of plants. Regardless of the many reasons that people find plants psychologically beneficial or seem to be attracted to keeping them, it is this special relationship that makes plants good candidates for inspiring human interactions, reducing stress, and increasing peace of mind.

**Relationships Between Plants and Veterans**

Since plants seem to have such positive effects on people, using the propagation and tending of plants as a form of therapy makes sense. The idea of treating military veterans with plant tending activities is not a new one. Horticulture therapy itself is a time-proven practice for veterans. According to the American Horticulture Therapy Association (AHTA, n.d.), in the 1950s, it was through treating injured war veterans that horticulture therapy was officially recognized as a therapy for all kinds of injury and disease. Dr. Benjamin Rush, known as a "Father of Psychiatry," first documented the positive benefits of horticulture therapy in the 19th Century through observing the improvements of patients with mental illness working in a garden (AHTA, n.d.).

Military veterans have a wide range of needs and some are derived from trauma and stress. While in the service of the United States, veterans are subject to many forms of stress, such as physical, mental, and emotional. They also may require additional support for other

needs that can range from medical assistance for mental and physical health issues as well as personal relationships with family, friends, colleagues, and reintegration into their communities and the civilian workforce. There are a multitude of different programs provided by the government, non-profit organizations, and even private businesses, which are dedicated to caring for the various needs of veterans in some form or another. Many programs are at or over their capacities to assist the number of veterans requesting help (Shane III, 2018).

Flemming (2015) claims that farming has been an increasingly popular trend among Post 9/11 veterans for unstated reasons. Beginning in 2007, veteran to farmer transition programs emerged, allowing veterans to learn how to start up, operate, and manage farms to help them move from a life of war to a life of growth, both metaphorically and physically. In 2014, a national Farm Bill passed that identified veterans as a specific group eligible for agricultural programs and benefits. This was caused by the booming number of veterans from all military branches who showed interest in becoming farmers. “These programs appeal not only to 45% of armed service members from rural America (USDA, 2013), but also to other veterans, government organizations, and educational situations” (Flemming, 2015).

Why veterans have such high interests in becoming farmers may have some connection to how farm work is structured and how it is regarded both in society and within the veteran community. According to Marshall-Genzer (2014), veterans like the independence of farming and self-paced work. She claims that veterans feel less confined and more comfortable on a farm than in a traditional mental health clinic environment. There is no stigma among the veteran community against working on a farm like there is with seeking help from mental health providers. Additionally, according to Marshall-Genzer (2014), they found that participating in farming activities through veteran farming organizations may also encourage veterans to seek out

professional help from therapists. This could suggest that for an indoor winter veteran program to be successful, it must mimic the structure of outdoor growing season programs in their flexibility for camaraderie and peer-support as well as independent work with a self-paced and self-motivated atmosphere. For a winter program to mimic this, it would require a lack of pressure to engage in activities and allow room for each individual to have options for the level of community engagement in which they wish to participate.

However, the downside to the physical nature of farm work is that veteran populations are more likely to have disabilities than non-veteran populations (Holder, 2016) and what these soldiers-to-farmers programs lack is a suitable option for people with mental and physical disabilities. It is no secret that farming activities take a strong back and hard work, and for those with disabilities, such as mobility issues, chronic pain, and mental disorders that increase the difficulty of socialization, this limits their ability to use the programs. Thus, the outcome of the present field project is to build an example curriculum that is fully accessible and inclusive to all types of people, regardless of skill level or ability. That way anyone can learn to care for plants and receive their many psychological and physical benefits. Focusing the population for this study on military veterans also gives more support for reintegration among civilian populations as well as other possible mental, physical, and social needs as described above.

According to the U.S. Census Bureau in 2015, there were 19.3 million military veterans and of those veterans, 3.8 million had service-connected disabilities. That is 19.6% or just under one-fifth of all veterans, and this was only considering those with Veterans Affairs (VA) “service connected” disabilities. It becomes much more difficult to determine the total number of truly disabled veterans outside of the VA system. Some veterans won’t claim disability regardless of its presence in their lives. Although their reasons may be personal, there are other obstacles that

could be discouraging veterans from making a disability claim, such as the VA's nine-month backlog of applications (Flemming, 2015). This, coupled with the fact that initial claims are often rejected (Phillips, 2017) and that appeals take over a year to begin the evaluation process and up to five to be finished (Absher, 2017), is discouragement for veterans to pursue their benefits.

In addition to the above information, Tanielan et al. (2008) states that 18.5% of soldiers returning from Iraq and Afghanistan suffer from post-traumatic stress disorder or depression and 19.5% suffered from a traumatic brain injury. There is no doubt that this contributes to the higher rate of suicide found in veteran populations (Lee, 2015) and marks the population as candidates for additional mental health care support such as what is found in horticulture therapy. This makes it clear that current farm-based programming for veterans should be expanded into year-round programs. These programs offer veterans ways to take control of their own mental health treatments through a sense of completion and belonging, while increasing the likelihood of seeking treatment from negatively stigmatized mental health clinics.

## A Brief Review of Local Horticulture Therapy Programs

There are two main Washington State horticulture therapy programs that interested me in developing my program: Growing Veterans in Lynden and the Victory Farm program under GRuB (Garden Raised Bounty) in Olympia. Each of these programs is different in their focus and mission but both wish to help veterans with mental and physical issues through farming activities. They both address the same root needs of veterans for camaraderie and community support.

Growing Veterans is a veteran-specific program whose mission is to use the experience of farming to aid in the reintegration of soldiers into society, reduce isolation, and engage in peer

support as well as provide many other benefits of working together in a farming setting. They call their programs “dirt therapy” (Saylor, 2017), and this seems synonymous with horticulture therapy. Both terms apply to any type of plant tending where the focus is to alleviate symptoms of some form of illness, whether mental or physical. Growing Veterans couples their dirt therapy with explicitly taught and implicitly applied principles of peer support to give veterans a place that they can seek personal mental and physical health. They believe that most veteran problems spring from social isolation (Growing Veterans, n.d.). Some of their main challenges locally is that that the veteran population in the nearby area of Lynden is not as dense as near Joint Base Lewis-McChord in the Tacoma area making it difficult for many veterans to utilize the program. Another challenge may be that their organization does not have much flexibility to expand due to budget and personnel limitations. Because of this, new ideas and challenges represent financial risk for their organization.

GRuB, however, is not directly a veteran program but it has a directly veteran led and focused program. Its main mission is focused on the education of youth during a summer school that is supported by Thurston County. Although the density of veterans in the area is high, they were forced due to circumstances to reinvent their Victory Farm program and its very existence has been challenging for the parent organization due to disputes over the land used for the program. However, the way its non-profit organization is set up is financially stable due to support from the county and allows for the additions of new ideas and challenges with less risk to the parent organization. They also have the physical space and resources to run indoor classes at their facility, which allows for independent parties to teach classes there.

Overall, the focus of these programs is to provide military veterans with a place to learn new skills, have fellowship with other veterans and their community, and heal themselves in

whatever ways they need through farming type projects. In this way, veterans pursue mental health through performing various farming-related tasks. The biggest deficiency to these types of programs is that they tend to only have activities during the growing season. This eliminates their ability to provide veterans with therapy during the off-growing season. In Washington State and other northern states, this may be more of an issue since the growing season is short, for example, Washington State's growing season is approximately May-October. That leaves approximately 6 months of off-season. Although there are some days of prep work before the growing season and some days of clean-up after the growing season, the work is inconsistent. This is an issue that should be addressed for programs that wish to be considered therapeutic. Mental and physical health issues persist year-round and their treatments should try to do the same.

**The benefits of off-season programming.**

Since winter has fewer farming activities available, indoor programming should be considered. There are a multitude of ways to bring tending plants or gardening indoors into the home, business, or anywhere with the appropriate interior temperature to support plants. This project shows just one example of how the included lessons can be implemented. It may be most effective to use a preestablished curriculum for indoor gardening through a continuing educational lens. This way military veterans can learn how to build and maintain their own indoor gardens and have a mutual place to share their experiences with indoor plant care that is not seasonally based. Since the goal of this off-season programming is meant to resemble the benefits and structure of the outdoor growing-season program, this leaves a broad opening for the types of workshops or classes that could be performed and should keep in mind the interests of the veterans in the regular program as well as potential interests to those with less physical or

mental abilities. Learning about how to care for plants increases knowledge and interest in plants, so it would make sense that a winter curriculum would continue the hands-on environmental education that is found in the summer programs.

For example, during the off season of a growing season-based program, lessons could include exploring the lifecycles of plants and their needs by plant type (such as succulent, tropical, and temperate), which can be used as a model to increase awareness of how human activities affect the overall environment. Building ecosystems such as vivarium habitats may be a good way to increase learners' understanding of how ecosystems work and recycle waste to continue growing. These examples weave the principles of environmental education into the lessons, so students will be learning about their environment regardless of if that point is acknowledged by the instructor of the class

## PROGRAM DESIGN

This curriculum was written based on an assumption that there is still a stigma against seeking mental health both within the military and thus throughout its veterans. Therefore, instead of directly stating the intent of providing peer support and mental health support, this curriculum instructs teachers on how to set up the learning space and facilitation for intrinsic peer support through encouraging interaction between participants. It must be noted that due to the stigma against mental health, some veterans may act defensive and/or sarcastic about participating in a directly stated mental health program.

The EE aspects are less of a challenge since they represent a broad spectrum of ideals that help raise awareness and motivation to do something about environmental issues. Adding in principles that align with the goals of EE can be as simple as stating facts while teaching. For

example, while teaching a lesson on building soil, explaining that coco fiber is more sustainable than peat moss due to the fact that peat bogs take at least 150 years to develop and are easily destroyed through the vacuuming process during the peat's collection. This could help students make better choices about the materials they purchase and use for their gardening projects.

Learning how plants grow and how ecosystems work should also have some effect on the awareness and appreciation of nature and its functions by students. From here, the need to act and take on a stewardship role towards the environment is another step forward from this foundation. By teaching people to care about the nature in their own homes, they can be encouraged to take greater responsibility for their impacts on larger ecosystems and the world environment in the broadest sense.

According to Drebing (2016), peer support comes from trust and acceptance. This means that the group must have at least some feeling of safety and relaxation. This is not something easily written into a lesson, and yet is vitally important for the effectiveness of this curriculum. Since there is a stigma against mental health, the curriculum is broken into a Teacher's Guide and Student's Guide. This will keep the students from having access to any parts that may upset them as the Teacher's Guide goes into detail about how to set up a mentally supportive work space. The goal of the Teacher's Guide is to aid in the facilitation of peer support, the lessons, and activities. The Student's Guide is for the students to use for procedures and as quick references for information. This guide is set up as practical application and how-to only. This way students gain the benefits from a peer supportive space without having to directly acknowledge it.

To weave environmental educational aspects into the curriculum, the 16th edition of Project WILD (2007), K-12 Curriculum & Activity Guide was used as a base template for

writing lessons. It was then modified as needed to fit within the parameters of an adult, military veteran-based curriculum. With this foundation, ecology, biology, and other sciences were written into both guides respectively to help teachers have materials to guild them as well as to simplify scientific concepts and increase the accessibility of the lessons for all ages, abilities, and interests. Many concepts were carefully broken down into base components and only core concepts are presented in the student materials. This allowed for more information to be present without making the necessary work to gather the information overwhelming. Please refer to https://everyonecangrow.wixsite.com/everyonecangrow for more information.

**Module Design**

*Everyone can Grow! (ECG!)* includes four example modules that are designed to be taught as a winter curriculum. It is by no means exhaustive of information about indoor gardening. Instead, it is meant to inspire others to build programs and create their own modules and lessons by building on ideas after the initial use of the curriculum. *ECG!* includes basic botany principles, indoor gardening information, how to build indoor ecosystems such as vivariums and how to use plants in artistic ways. For example, monographs. These example lessons are meant to illustrate how to teach veterans about science, including botany and ecosystems, as well as how to teach artistic principles through various crafts such as building terrariums, keeping plant journals, and preserving plants for herbariums or other artistic uses. Please refer to https://everyonecangrow.wixsite.com/everyonecangrow/teacher-s-guide for more information.

The modules chosen for this project were based on what is assumed to be the most useful foundation for indoor plant care. There are many other ways to interact with and appreciate

plants, and these are only an outline of what this program could include. Below is more detail explaining the four modules chosen and why.

*Module 1: Basic Botany* – Teaching the biological processes of how plants live and grow allows students to understand how plants work on a microscopic scale and gives them a greater understanding of plants. By understanding these various processes, students can gain appreciation and observational skills that can enhance the health of the plants they keep. These lessons are also meant to help students learn the proper terminology used when describing plants in an effort to help them identify plants. This skill is essential for keeping plants healthy in the long term.

*Module 2: The basics of indoor gardening* – These lessons provide the foundational knowledge about caring for indoor plants. It is meant to be the most practical for physical activities. The lessons do not go into detail about individual species. Instead they broadly give care advice and encourage students to identify and research the plants they keep at home.

*Module 3: Building an indoor ecosystem* – These lessons take indoor gardening a step further into managing an entire (simplified) ecosystem. This module not only increases the complexity of plant care, but also lays a foundation of ecological knowledge to help students broaden their understanding of how ecosystems create the environment within which we all live.

*Module 4: Plants and art* – This is a collection of activities meant to increase appreciation and understanding of plants through making observations about them in various ways through art.

**Lesson design.**

Each lesson is organized into the following parts as necessary for individual lessons:

Teacher's notes: These are the notes that help the instructor conceptualize the lesson plan. This is anything that is important to the lesson that the instructor should be aware of to better run the lesson. This may also include tips, tricks, and fun educational facts.

Methods: This is a brief description of what the lesson entails. It explains what to expect when teaching the lesson, such as a lecture, activities, and what chapters of the student manual to use. This functions as the objectives for the teacher.

Objectives: This is what the student gains from the lesson. Bloom's taxonomy (Bloom, Krathwohl, & Masia, 1984) was used to best describe the goals of the lesson.

Background: This can include anything from content and contextual background to other factors surrounding the lesson that are important and why they are important. This reflects the specific needs of a lesson, for example, there is not much content background for building a leaf press, but there is for biology. It also includes any relevant history that pertains to a lesson, such as a brief history of the binomial nomenclature of plants for the lesson on identifying plants.

Evaluation: This is how the instructor will evaluate the effectiveness of the individual lesson taught (Yuen & Terao, 2003).

Materials: These are the physical needs of the class. It includes handouts, books, writing utensils and notebooks, tools and items for activities, etc.

Procedure: This is the step by step guide detailing exactly what to do to conduct the lesson.

**Student Resource Design**

The student materials were written to aid in the implementation of lessons of the teacher's guide. Since each lesson has specific activities and knowledge involved, it quickly became apparent that having an example of what materials should be used to support those lessons was needed. The chapters in the student guide can support far more lessons than what is written in the teacher's guide. Please refer to https://everyonecangrow.wixsite.com/everyonecangrow/student-materials for more information.

*Chapter 1: Basic botany* – The chapter, Basic Botany was written to help simplify concepts of biology relating to plants. This chapter begins with vocabulary around plant biology, then explains the live cycles of plants, and ends with photosynthesis and why the colors of light matter to plants.

*Chapter 2: Illustrated guide to plant terminology* – This chapter introduces vocabulary around identifying plants to aid in the use of dichotomous keys for plant identification.

*Chapter 3: Light sources* – This chapter introduces the vocabulary used by light bulb companies and explains in practical means how to find the proper type of lighting for plants.

*Chapter 4: Soils for indoor gardening* – This chapter explains how different additives affect soil. It is meant as a simple and practical guide to help students understand more about how to make their own soil mixes to best suit the plants they own.

*Chapter 5: The basics of indoor plant care* – This was written as the most foundational knowledge of plant care to assist new plant owners in understanding how to care for various plants by their broader type and understand what the basic needs of plants are without going into full detail on individual plant species.

*Chapter 6: Growing sprouts* – This is a practical guide for how to grow sprouts at home. This is meant to supplement a workshop on the same topic.

*Chapter 7: Growing oyster mushrooms* – This is another short and practical guide on how to grow oyster mushrooms indoors. It is meant to be a potential activity for other lessons.

*Chapter 8: Basic hydroponics and aquaponics* – This chapter details in the most practical way possible how to build a simple hydro- or aquaponics system. Although it does go into detail on how to make more complex systems, it is meant more as an introduction to them than an exhaustive guide due to personal budget restraints during the writing of the chapter.

*Chapter 9: Common indoor pests, diseases, and remedies* – Arguably if there is a chapter on plant care it would be incomplete without information about possible health issues plants may develop throughout their lives. Every living thing can get sick or malnourished and this chapter is meant to help people identify these issues and treat them.

*Chapter 10: Building terrariums and vivariums* – This chapter details how to build terrariums and vivariums in the most practical and financially efficient way. It is important to understand the simplest ways to build these systems since they are arguably too expensive to build for most programs without a significant budget.

*Chapter 11: Natural fish keeping* – This chapter is specifically to teach students how to set up aquariums using all-natural methods that require less energy and equipment than modern fish keeping. Again, there is a focus on how to set up the aquarium in the most financially inexpensive way.

*Chapter 12: Maintenance crews* – This chapter details how to care for the various animals that live as decomposers or detrivores in the soil layer of terrariums and vivariums.

There are several types of animals included: Arthropods such as springtails, which consume fungi and small organic particulates in soil; isopods, which are soil dwelling crustaceans that decompose organic matter, commonly known as wood lice or roly polies; and worms which also help decompose organic matter as well as tilling soil.

*Chapter 13: Herbariums* – This chapter brings art to science through building herbariums as both artistic and scientific documentation of plants found during various other activities, such as walks or sitting in a park, as well as just a way to record and appreciate plants through drawing and identifying various parts of plants. This way students can learn how to record their observations in a way that allows them to use their own notes to compare new species to what they have previously recorded.

*Chapter 14: Pressed plant art* – This is an activity guide for various art projects that use pressed plant materials.

*Chapter 15: Concrete planters* – This chapter explains how to make planters for those who wish to take "do it yourself" to the next level. This allows students to make their plants more fully their own by teaching them a method to make their own pots.

**Pilot implementation**

The on-campus implementation did not implement the full program due to time and resource constraints. Instead, the implementation lessons were chosen based on the most fundamental information needed to begin keeping indoor plants. The first lesson included an introduction to caring for houseplants, selecting grow lights, and an introduction to understanding soil mixes for indoor gardening. The second lesson included how to build and maintain an indoor composting worm bin for indoor gardening and the same introduction to

caring for houseplants as the first lesson. The third lesson included the same introduction to caring for houseplants, indoor ecology, and building terrariums. Since each lesson allowed students to bring home a live plant, the goal of the pilot was to support students in keeping their new plant in the best health. Thus, none of the lessons concerning art were used.

For the implementation of this curriculum, *ECG!*, local Western Washington University veterans were invited to participate in a 3-lesson pilot on campus. This implementation occurred on three Wednesdays, Nov 14th, Nov 28th, and Dec 5th, respectively. The times for the first two classes were between 1pm and 3pm, while the third class was between 5pm and 7pm. The first hour of each class was directly related to instruction and activities, while the second hour was meant for community building through discussion and conversation. This was meant to help facilitate people making connections to each other through a newly shared experience.

Classes were implemented using the guides written in the curriculum. This pilot did aid in assessing of the modularity of the curriculum. No supplemental materials were used outside of the prepared *ECG!* curriculum.

It is important to reiterate that how this curriculum is taught is arguably more important than what is taught. Much of the therapeutic aspects are in how the environment for the lessons is constructed and must allow flexibility for the students to do what they believe is most needed for themselves. For this purpose, room 221 in Arntzen Hall was reserved for the classes. This room has large bay windows, tables and chairs, as well as more comfortable furniture such as couches and an easy chair. This room also contained a projector and computer which aided in the use of supplementary material for the lesson.

**Implementation lesson design.**

For the purposes of implementation, the teacher's guide was used to generate lessons that would fit with the time and available resources. Each lesson was crafted with foundational knowledge in mind as well as one aspect that would make each lesson unique for students who may wish to attend multiple lessons in the implementation. The room used for implantation had large bay windows, adequate tables and chairs for up to fifteen students (which was the projected number of students), and a projector which facilitated a PowerPoint presentation. To implement this curriculum at the WWU campus, an IRB was filled out and the implementation was deemed a category 2 exemption from full IRB review according to the WWU IRB handbook (Western Washington University, n.d.). Signed consent forms were distributed to students before each lesson so they could choose whether or not to participate in the lesson, activity, and focus group. Students were free to leave at any point during the lessons. Below are more detailed explanations of what each class included.

Class one of the implementations included a brief PowerPoint presentation concerning the care of plants, how to make soil mixes, and how to choose proper lighting. After this, the repotting activity was introduced. A PowerPoint slide was left on screen describing the various plants students could choose from to repot and take home so that they could make the best decision of which plant was most suited to their home environments. During the selection and repotting activity, any questions about the activity, plants, or proper conditions to keep the plants in were answered. After the plants were chosen and repotted, the focus group activity began. The second hour of this class went unused as there were only two students, so the activity required less time to complete and there were not many student questions.

Class two of the implementation included the same basic lecture about plant care and introduced the ecological concepts behind worm bins, such as the role of worms as detrivores. This class was less organized than the first class and transitions between topics were weak, leading to some confusion about the point of the lesson. The repotting activity was implemented the same way as before and went well. Again, the second hour went unused as most participants had other engagements and could not stay the full allotted class time. The focus group was initiated during the repotting activity for brevity.

Class three of the implementation was more involved as the activity was building terrariums. Although the same basic structure of the plant care lecture was used, there was a need to explain the parts of an ecosystem and how the terrariums they'd be building mimic those natural systems. It was more difficult to manage the number of students who each were able to make different choices as to the type of ecosystem they wished to mimic in their terrarium, namely desert or tropical. Each had corresponding soil, light, and moisture needs that were thoroughly explained. This class required full use of the two-hours. The focus group began when most students were finished with their individual projects.

**Challenges for implementation.**

One of the biggest challenges prior to implementation was the budget. Without the financial support of an organization, grants, or fees for classes, procuring the necessary supplies to perform the activities required for lessons was difficult. Each lesson required supplies for the activity portion of the class. Although each lesson had been researched for the most financially minimal ways to conduct it, some capital was inevitably needed. Grants were difficult to procure in the time prior to implementation. Two of three of the WWU grants applied for were not

awarded at all and the third declined to support this project. Ultimately, personal funds were used to finance the implementation.

In addition to funding, outreach became an apparent weakness prior to implementation. Although flyers were posted around campus, they did not entice participation. Word of mouth appeared to be the most useful method of recruitment prior to implementation. Due to time constraints, most outreach materials were not made until after the first pilot. This undoubtedly influenced participation in the pilot.

The necessary plants were secured through donations from multiple parties, such as Dr. Gene Myers and through self-started clones produced by Rachel Elam. These plants were supplemented through donations from the Facebook group Broke Plant Traders, as well as discounted plants from Lowes to ensure enough material would be available to students. The containers for the terrarium lesson were obtained from the local Goodwill store and the rest of the supplies as well as necessary tools were procured from Lowes, Home Depot, and Ace Hardware at the researcher's expense.

**Evaluation of implementation.**

The evaluation for the implementation was accomplished through two surveys: an after class focus group after each session; and a survey sent to all participants thirty days after the last lesson to assess any lasting effects or perceptions of keeping a plant and/or how their plant is doing in their care. See Appendices 1 and 2 for the surveys used.

Participation in the classes was lower than anticipated with two students attending the first class including one veteran; three students attending the second class including one CONSISTENCY IN NUMERAL veteran; and seven students attending the third class with two

veterans. After-session focus groups revealed the classes to be "enjoyable," "fun," and "stress relieving," according to the interviewees. Many suggestions were made to broaden the class into an open forum where students could go before midterms and/or finals to destress and do something entertaining. For the first two classes, no one was able to stay for the full two hours of the class-time; thus, the community building parts of the lessons were mostly unused. All participants stated that they would attend more classes concerning indoor gardening.

A sample of comments about the overall program from interviewees:

- Great way to spend the afternoon.
- Good for stress.
- So easy to understand.
- Rich sensory experience.
- Loved it all.
- Fun.

Critiques about lesson 1:

- Need to start lesson with why the lesson is important ~ learning new skills.
- Have individual handouts for students to take home, and not just the PDF files sent to students.

Critiques about lesson 2:

- Use better transitions between topics to help students understand the relevancy of why things are being taught the way they are.

Critiques about lesson 3:

- Should be available to either drive student home or give bus passes since the class ended so late [7pm ending time].
- Should have had a longer class time to work on projects [later than the 7pm ending time].

(This class ended on time and students were allowed to stay and "hang out" if they wanted.)

After each class, the materials for the student guide were sent to participants via email for further information since the website had not yet been built. This allowed each student to have full access to all the information taught in the classes in PDF format.

## DISCUSSION, CONCLUSION, AND NEXT STEPS

The pilot implementation introduced new plant owners to plant care. It was not able to assess the repeatability of such a curriculum. The evaluation was unable to assess continued interest in attending plant care workshops after receiving a plant, i.e. "would students wish to continue to attend such classes year after year?". Due to the limitations of time and available space, this aspect remains unevaluated.

In order to address the issue of possible disinterest in continued participation, it would be valuable to have a dedicated workspace and times for a moderator to be available. The workshops should be advertised as open house and allow people to freely come and go as they need and should have open hours during prime times that people are most available to attend either during the day and/or evening. They should encourage attendees to work with and help each other with projects. These workshops should be less structured than a class with a teacher,

instead with someone available to monitor who is available and accessible for questions and suggestions. This format would more closely resemble outdoor veteran farming programs.

The low participation found during implementation was most likely due to the combination of a lack of initial advertising and the timing of the first two classes being in the early afternoon (1pm-3pm). The third class was later in the afternoon when most students would not be in other classes (5pm-7pm) and this may have contributed to the number of attendees. For further iterations, having a longer period before classes begin to advertise would be helpful to attract more students.

**Outreach**

Since outreach was identified as an issue from the implementation of the on-campus pilot, a social media presence has been established for *ECG!* using Facebook, Twitter, and Instagram to further advertise the curriculum. In addition, all the materials used to implement *ECG!* were built into a website for ease of access. The materials have also been published into two books, a teacher's guide and student materials respectively using Kindle Direct Publishing for both electronic and physical versions of the books. As a way to continue outreach for *ECG!*, attending environmental conferences, such as Storming the Sound and the ECOnet Summit, were other ways used to spread the word about *ECG!*. For the purposes of these outreach events, the creation and use of informational pamphlets and cards was implemented to increase the exposure of *ECG!* wherever possible (Appendix 4).

To continue the outreach, a second pilot program has been planned for the Bellingham Veteran Center. The curriculum will be facilitated by the author with the assistance of one of the mental health counselors and will include lessons from each module respectively. The counselor can help explore the program's psychological benefits, and peer supportive principles will have

more opportunity to be used. As of the writing of this report, this pilot has not been conducted and is still in the negotiation stages. However, by applying this program directly to a mental health care-related organization, it could lead to the *ECG!* program being branded as "mental health" which would lead to a lack of participation from military veterans with stigmas against seeking help from health care facilities.

Overall, this program is built on the evidence that anyone, especially disabled veterans can benefit from keeping houseplants. The pilot program provided modest but positive results supporting these foundations. However, the population that participated were mostly people who had prior contact with me or were familiar with me either as a peer, co-worker, or fellow veteran community member. If this program is to reach its true target, there is a need for a more direct and dedicated outreach plan.

This target population are those who are isolated due to mental or physical disability and/or perceptions about safety, trust, etc. This population also includes those with negative stigmas against mental health and those who do not have confidence in their plant care abilities. The website is meant to supplement this outreach, however, to fully support those who may have interest without the confidence to try, a more hands-on and personalized outreach would also be necessary. It will be easier to appeal to veterans who have a lack of confidence in keeping plants indoors as a hobby and personal therapy than reaching those who are isolated due to other reasons.

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## APPENDIX 1

Focus group questionnaire

"Thank you for participating in this workshop session. I appreciate each of you for taking out time to be here. I would like to ask a few questions about the session and how you are feeling in relation to how you felt before the session. The questions are arranged much like an after-action review since we are all familiar with that type of survey."

1. What did you like about the class?
2. What did you not like?
3. What could have been done differently?
4. Will you be attending the rest of the sessions? Why or why not?
5. How do you feel now in relation to how you felt when you started the session?
6. What would you say are the main benefits you experienced from the workshop?

## APPENDIX 2

Final survey

Thank you for agreeing to fill out this survey from the veteran's winter curriculum implementation. These questions regard how you feel about your participation in the session(s) conducted on Wednesdays Date 1, Date 2, and Date 3.

This survey is meant to assess how attending the workshops and keeping a plant has impacted your life, or not. Please answer truthfully. Optional: Attach a picture of your plant to your response.

If not using this file to respond to the survey, please indicate which number your response is connected to so we can keep track of responses.

1. Which workshops did you attend? Mark all that apply.

   Date 1 _____ Date 2 _____ Date 3 _____

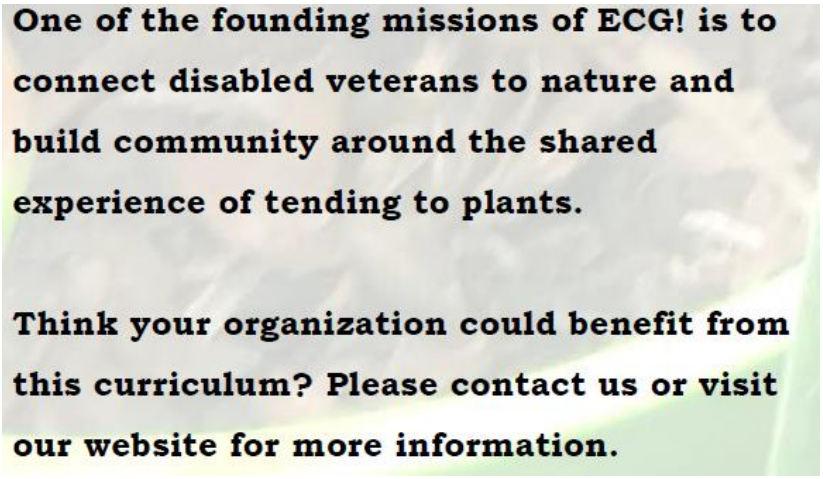
2. Did you find the workshop(s) helpful for how you care for your plant?
3. Did you find the workshop(s) helpful for how you independently research plant care?
4. Would you be interested in attending more workshops like these about caring for and keeping plants?
5. Would you recommend these types of workshops to other veterans? Whether yes or no, please briefly explain.
6. What would you say are the benefits you've experienced from the workshop(s)?
7. Have you noticed any changes in your mental attitude or mood from keeping a plant?
8. How is the plant that you potted and took home doing?
9. Did you meet anyone new at the workshop that you now keep in contact with?
10. Once again, thank you for your participation in the workshops and for filling out this survey and returning it. I greatly appreciate your time and interest.

## APPENDIX 3

## APPENDIX 4

*ECG!* Information Card
Front:


Back:



*ECG!* Brochure for organizations who may wish to adopt the program

From the left: Inside flap, back page, front page

Everyone can Grow! includes a curriculum and the educational materials necessary to bring as much of the wonder, beauty, and majesty of nature indoors. With this curriculum, everyone can feel that connection to their environment in a deeper way while creating a peaceful and wonderful space to live and work in.

This program is meant to help organizations initiate their own indoor gardening programs.

Learn more about Everyone can Grow!

Please visit our Wix site for full access to the curriculum and supplemental educational materials.

**Https://trelam88.wixsite.com/everyonecangrow**

Visit us on Facebook, Twitter, and Instagram **@everyonecangrow**

Contact us via everyonecangrow@gmail.com

We appreciate your interest!

# Everyone Can Grow!

A curriculum to bring nature indoors

## Indoor plants are for everyone!

Anyone can grow a plant and receive their many physical and psychological benefits!

Think you have a "brown" thumb?

Well we are here to help you connect with nature and learn that there is no such thing as a "brown" thumb and that EVERYONE CAN GROW!

From the left: Interior left, middle, and right

## The many benefits of indoor gardening

Keeping plants indoors has many benefits. Some are studied, and some are claimed and assumed. Remember that for things to be psychologically beneficial there only needs to be a perception of benefit, regardless of physiological proof. However, there are increasing studies in this area and more benefits are being studied in scientific detail. Something to note about the studies done on the effects of plants on people is that they are heterogeneous, meaning that conclusions are more difficult to generalize.

The most common psychological benefits cited in literature are reductions in stress and increases in focus. These benefits were found to occur when plants were within the same space as the person or people being studied, such as on a nearby desk. Most were presence or absence studies so they did not consider having artificial plants nearby. Although another study showed that there is a difference between people working with artificial plants versus real plants. They found that people making artificial plant arrangements did not receive the same reduction of stress and a sense of enjoyment as those who repotted living plants. It is from this reduction in stress that some claim that plants improve happiness, creativity, and mental health. A study done on post-operative patients showed that having plants in their rooms improved their perceptions of their rooms and care which contributed to faster recoveries when compared to patients without plants in their rooms.

In addition to the psychological benefits of having plants in the same room as people, there are also physiological benefits. For example, increased pain tolerance and improved recovery from illness. There is also evidence to support that physically working with plants, such as repotting them, lowers heart rates and blood pressure. There are also claims that keeping plants nearby a bed will improve sleep through the improvement of air quality.

Plants definitely have an effect on air purification. Plants remove at least 59 known volatile organic compounds from the air, such as formaldehyde, carbon monoxide, carbon dioxide, and benzene. Plants may also negate cigarette smoke, although too much cigarette smoke may also clog the stomata of the leaves, harming the plants as well. There is also a growing trend in using plants to reduce road noise, lower interior air temperatures, balance humidity, and decrease dust.

With all these wonderfully positive effects, who wouldn't want to keep a few plants around?