



# Experiential learning in a problem-based course on urban forest planning and management

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## ABSTRACT

Environmental management in urban spaces involves creative problem-solving with regard for public communication, economics, and socio-political dynamics. As post-secondary institutions provide increasing opportunities for developing these skills, there is little discussion about pedagogical approaches in urban forestry and sustainability programs. A seminar-format university course was designed and implemented to teach management planning in urban forestry. The course employed experiential learning to enhance students' capacity for identifying problems and proposing novel solutions to classroom-confined and live case studies in urban forest management. Student focus group participants valued the incorporation of operational aspects into post-secondary education, as well as reflective opportunities provided through peer-to-peer learning, peer-based evaluations, and opportunities for autonomous active experimentation. Students experienced a positive shift in perceptions of operational staff, underscoring the importance of arborists' work and their experiential knowledge. The experiential framework thusly provides a valuable opportunity to introduce real-world management and operations to students within a safe space for exploration.

## 1. Introduction

In urban areas, greenspaces and vegetation are critically important for human health and well-being (Wolf et al., 2020; Yang et al., 2021) and supporting biodiversity (Nielsen et al., 2014; Threlfall et al., 2016). In urban forestry, trees and shrubs are managed to improve ecosystem services while minimizing the potential disservices (Miller et al., 2015). Such management falls under the purview of arborists and urban foresters. While arborists manage trees at the individual level (Lilly, 2010), urban foresters work at a larger scale, managing many trees and large shrubs across the urban landscape (Ferrini et al., 2017).

Similar to many management sectors, urban forestry requires critical thinking and creative problem-solving. Because urban foresters are engaged at the confluence of vegetation management and socio-political systems (Campbell et al., 2022; Wirtz et al., 2021), their work involves making decisions influenced by wildlife conservation, economics, and local politics (Martin & Almas, 2023; Vogt, 2020; Vogt et al., 2015; Wirtz et al., 2021). Urban forestry education consequently incorporates both the natural and social sciences with educators emphasizing skill development to meet the complexities of urban forestry as a profession

(Andersen et al., 2002). Given the multiple domains within urban forestry, there has been discussion about their varied importance (Elmendorf et al., 2005; Martin et al., 2023). While conventional topics like tree biology, soil sciences, tree planting, tree pruning, biotic disturbances, and risk assessment are commonly taught (Elmendorf et al., 2005; Wiseman et al., 2011), several management topics are under-represented in curricula. These topics include career development, certifications and professional governance, economics, public affairs, non-profit collaboration, operational optimization, and urban forest management (Elmendorf et al., 2005; Scanlan et al., 2021; Vogt et al., 2016; Wiseman et al., 2011). Often, the commonly taught courses reflect the conventional role of urban foresters as managers of arboricultural operations versus the contemporary holistic and broader field (Konijnendijk et al., 2006).

As a component of this conventional versus contemporary disjunction, urban foresters were conventionally promoted from municipal arboriculture positions, rewarding experiential knowledge gained through previous roles, rather than post-secondary education as a career pathway. However, post-secondary urban forestry programs are becoming increasingly common (Elmendorf et al., 2005).

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Post-secondary education is an increasingly emphasized prerequisite for urban foresters in the contemporary context, yet entry-level urban forestry positions for recent university graduates are sparse or competitive (O'Herrin et al., 2018).

Recent university or college graduates must compete with applicants who have worked through the conventional route and thus have considerable experience in arboricultural operations (O'Herrin et al., 2018). If the recent graduate is successful in obtaining the job, they encounter a second issue: without previous work experience, the recent graduate will be delayed in obtaining relevant certifications. A particularly relevant and important example is the International Society of Arboriculture's Certified Arborist designation, a highly valued credential by employers that is often used in lieu of urban forestry-specific credentials (Dahle et al., 2020; Day et al., 2022; O'Herrin et al., 2018). While students could be taught about arboricultural practices and theories to prepare them for credentialing exams, they will still need to be taught with an insider's lens, and often critical lens, of the arboriculture industry to help them reach equivalent knowledge levels of arboricultural practice as those arborist applicants seeking to move into the urban forest management sector. These contemporary trends in post-secondary education in urban forestry and related fields also conflict with the conventional belief that post-secondary education is not of the same critical importance to future urban forest managers as specific skills or credentials (Dahle et al., 2020).

It is no doubt crucial for students to understand arboricultural practices and theories; however, in overcoming these conventional norms, post-secondary education can also benefit early career professionals by introducing them to the policy and managerial aspects of urban forestry (Konijnendijk & Randrup, 2005). Balancing the technical arboricultural operations with the policy, planning, and managerial aspects can meet the needs of industry while satisfying the interests of students and the rigor of post-secondary curriculum requirements.

Urban forestry educational programs are becoming more common (Elmendorf et al., 2005), benefiting the knowledge base and workforce diversity of urban forestry (O'Herrin et al., 2018). However, the majority of urban forestry pedagogical literature focuses on curriculum development, rather than pedagogical approaches to education. Reflecting on knowledge domains gaps across international urban forestry programs (Andersen et al., 2002; Elmendorf et al., 2005; Scanlan et al., 2021; Vogt et al., 2016; Wiseman et al., 2011), an urban forestry seminar was designed to teach operational management to fourth-year students. This paper describes the structure of the seminar and student perceptions following the seminar's completion in April 2023.

## 2. Background

### 2.1. Pedagogical background

The course relied upon the theoretical frameworks of the seminar model and experiential learning. Under seminar course models, lecture-based learning is de-emphasized and more time is allocated to active learning, including discussions, small group work, presentations, and peer-based evaluations (Tsui & Gao, 2006). Collaborative dialogue is emphasized, helping develop interpersonal skills and a future network for students pursuing managerial operations (Bedwell et al., 2014; Guldberg, 2008).

Seminars also provide conducive environments for experiential learning that help students to learn concepts through application and reflection (Kolb & Kolb, 2017; Kolb, 1984). Experiential learning helps students develop knowledge through four modes of learning, categorized into "grasping experience" and "transforming experience" (Kolb & Kolb, 2005). Grasping experience is facilitated through abstract conceptualization (e.g., lectures, readings) and concrete experience (e.g., case-based projects) (Ferguson et al., 2016; Kolb & Kolb, 2005). Transforming experience is facilitated through reflective observation (e.g., class discussion, peer-to-peer evaluation) and active experimentation

(e.g., class exercises, case assignments, mock scenarios) (Ferguson et al., 2016; Kolb & Kolb, 2005). Through the seminar structure, abstract conceptualization is reduced compared to a lecture-based course, allocating more time towards the three other modes of learning.

Comprising concrete experience, case-based projects or problem-based learning can be either realistic problems that are classroom-confined or live cases where students engage with external communities (Georgiou et al., 2008). However, the alternation between conceptualization and concrete experience in classroom-confined cases has been critiqued due to its resulting passive absorption of knowledge (Savery, 2015). To engage students in unique problems and develop their professional consulting and management skills, live cases fit well into both the collaborative project-based learning of the seminar and the concrete experience (Böcker, 1987; Ferguson et al., 2016; Savery, 2015). Live cases, as termed by Georgiou et al. (2008), involve external community groups within the learning process. Relevant to urban forestry education, these live cases provide an opportunity for students to approach a unique case, define the key issues, and work towards an implementable solution.

### 2.2. Urban forestry education

There is a paucity of pedagogical literature in urban forestry. As post-secondary institutions begin to grow the number of urban forestry courses available, it is important to discuss the content and the structure of course delivery to urban forestry students.

The University of British Columbia established a Bachelor of Urban Forestry (BUF) program in 2015. In addition to the BUF program's urban forestry major, students can choose one of two minors, Urban Green-space Management (UGM) or Landscape and Recreational Planning (LRP). The UGM minor was recently accredited by the Canadian Forestry Accreditation Board, meeting the academic requirements for the Canadian Registered Professional Forester (RPF) designation. A large focus of the UGM minor, as is true with the BUF program generally, is to prepare students for a career in urban forestry.

While many courses in the program discuss planning and management of parks and greenspaces, as well as the selection of urban trees based on biodiversity guidelines, this seminar-structured course offered a unique opportunity for students to learn about the operational management of urban forestry as it occurs in municipalities and consulting firms. Additionally, it complemented the existing problem-based learning capstone course, which focused on case studies at the university's campus, and the seminar model of an environmental justice course, which used small group discussions about previously published cases.

This paper presents a pedagogically topical approach to teaching urban forest management in a program that is well-regarded within the urban forestry profession. This paper highlights how similarly formatted courses could enhance student learning and improve the capacity of graduates to engage in managerial roles shortly following completion of an urban forestry program.

## 3. Course structure

From January to April of 2023, an upper-level seminar on urban forest management planning was run at the University of British Columbia. The objective of the course was two-fold: to address a curriculum gap with regard to urban forest management planning and to support students in working towards their International Society of Arboriculture certification exam by introducing arboricultural themes throughout the course. The introduction of these themes built upon the students' existing experience and knowledge per Kolb and Kolb (2005) and reflected the core knowledge domains required for the credentialing exam (Appendix A). Careful attention was placed on framing arboriculture theory and practice within the scope of an urban forester

who oversees the implementation of arboriculture crews, rather than an arborist who is directly engaged with arboriculture operations. An interest of the author was whether students felt that such coverage of arboriculture topics in the course would simultaneously improve their capacity as future urban foresters while also benefiting them in their post-graduate pursuit of ISA credentialing.

The course learning objectives were modified collaboratively with student input, but largely reflected the original syllabus. Following successful completion of the seminar, students would be able to:

1. Articulate and apply key arboriculture organizations, standards, and best management practices in operations planning for improving urban forest management.
2. Demonstrate awareness of the application of common arboriculture tools and equipment within the scope of municipal urban forest management.
3. Specify and justify the use of different arboriculture equipment for planting, pruning, and removal operations in an urban environment to best meet management objectives.
4. Devise solutions for responding to city-scale climate-based and biotic stressors and shocks of the urban forest.
5. Evaluate the feasibility of management plans and their implication for urban forest operations.

The course structure was based on the four modes of experiential learning theory (Fig. 1). Lectures and other abstract conceptualization activities were de-emphasized through the seminar structure of the course. Readings were assigned that included both peer-reviewed literature and arboriculture and urban forestry trade journal publications. Videos of equipment in operation and arboricultural practices were also assigned to demonstrate the application of concepts introduced in the literature. At the beginning of the semester, students delivered brief presentations (<5 min.) on chosen topics that related to themes covered in the course, including governance structures, pest management, and response to storm events. These presentations helped to build the collective understanding of operational approaches to urban forest management. The presentations also provided opportunity for students to critically analyze normative theories in arboriculture.

The second portion of the course introduced a heavier focus on active experimentation and reflective observation. Mock scenarios were introduced as miniature-assignments and larger case-based assignments facilitated student experimentation of course learning and conceptualization across common management domains (Table 1). The assignments comprised 65% of the course grade and were peer-evaluated. Following each active experimentation activity, discussions were facilitated in the seminar (reflective observation).

Through the second portion of the course, brief lectures were provided by the teaching team and guest lecturers (abstract

**Table 1**

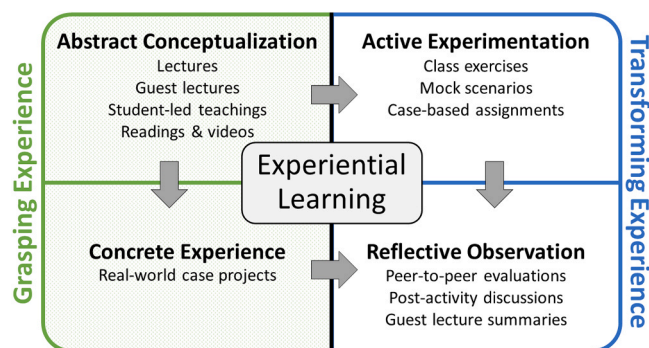
Assignments to support student learning in a seminar-structured course for third- and fourth-year students in urban forest management planning.

Assignment	Description
Tailgate Safety Meeting	Students created safety meeting documentation and presentations for various safety-related themes. Example topics included necessary first aid kit supplies and work at heights safety equipment.
Removal Strategy for Trees on a Busy Intersection	Students created a worksite layout plan and safety documentation for the removal of a tree on a busy intersection.
Removal Strategy for Trees in a Small Municipality	Using a live case from Manitoba's Model Forest (Victoria Beach), students created a removal strategy to mitigate wildfire risk while mitigating community disdain for tree removals.
Municipal Budget Decision	Using a live case study from Alberta, students used annual budget information and self-sourced price estimates to determine if a municipality should use a contractor or perform work in-house.
Budget Analysis of a Non-Governmental Organization	Using a live case study from Ottawa, students analyzed revenue and expense trends for an endowment-structured NGO to determine if the NGO was operating in a fiscally responsible way and whether they would advise their fictitious company's board of directors to donate to the organization.
Tree Protection During Construction	Using a live case study from Manitoba, students used ArcGIS Pro to create construction mitigation plans for a development, highlighting which trees needed to be removed and how the remaining trees would be preserved. Students thereafter discussed variability in decisions to remove or retain trees.
Tree and Plant Appraisal	Using a demonstration case from the university's campus, students appraised a tree using the Trunk Formula Technique/Method from the <a href="#">Council of Tree &amp; Landscape Appraisers (2019)</a>
Resumes and Cover Letters	Students wrote resumes and cover letters tailored to their ideal future employers. Peer reviewers helped evaluate the readability and formatting of the resumes and cover letters and indicate any gaps or lacking clarity.

conceptualization), followed by group discussion (reflective observation). These group discussions largely focused on using reflective learning and discussing how the lecture's topic fits into the wider themes of urban forest management. Examples of brief lectures included the use of Program Evaluation and Review Technique (PERT) distributions in estimating budgets, contract management and tenders, and economic issues of Dutch elm disease management in Canada.

In the third and final portion of the course, concrete experience was emphasized through live cases and group work. Students worked collaboratively to answer questions posed by an Indigenous non-profit and an Indigenous healing center. The Indigenous non-profit asked questions about community-led tree planting. The Indigenous healing center asked questions about construction management of trees, as well as windthrow, replanting after construction, and potential pest issues. This was the first opportunity for the students to engage Indigenous Rightsholders in their urban forestry program, and meetings with the Indigenous groups were facilitated to provide opportunities to interact with clients. This built upon the management learning objectives by introducing community engagement as a requisite for sustainable management. The final reports were structured as consulting reports, worth 25% of the final grade, and were evaluated by external experts.

The students also completed a final exam, worth 15% of their final grade, that replicated the ISA's Certified Arborist exam. The exam was formatted as multiple choice, multiple selection, and true or false questions.



**Fig. 1.** The four modes of experiential learning per Kolb & Kolb (2005) implemented in the seminar-based course activities on urban forest management planning.

#### 4. Focus group interview

A focus group was conducted on the last day of class to engage students in a program evaluation discussion about the course. The use of a focus group was chosen because of the small class size of 11 students. It is advised that online surveys not be used for classes under 100 students (Nulty, 2008). A focus group was additionally beneficial as it could be hosted during class time and student participation could be encouraged through incentives (free food for attendees).

In Canada, the *Tri-Council Policy Statement: Ethical Conduct for Research Involving Humans* (Canadian Institutes of Health Research, 2018) sets out the expectations for post-secondary institutions conducting research. Per Article 2.5 of the Tri-Council Policy Statement, quality assurance/improvement and program evaluation activities, including those that use focus group with students, are exempt from otherwise required research ethics board (REB) reviews. This exemption was verified with the University of British Columbia Research Ethics Board.

At the start of the focus group, it was explained to students that their participation was voluntary and that they could leave at any time. The focus group participants were also informed that they could redact any statements made during the focus group or have their statements removed from the transcript altogether. While food was offered as an incentive, those in attendance could receive the free food without participating in the focus group. No bonus marks were offered as incentives and the participants were informed that their participation in the focus group would not influence their grades nor their standing in the course. The semi-structured interview guide is included in the [supplementary material \(Appendix B\)](#).

Seven students participated in the focus group. From the remaining four students, three had conflicting external conflicts that precluded their participation and the fourth elected not to participate. The recordings were transcribed into a Word document and deidentified. Direct participant quotes provide evidence of the students' perspectives on the capacity of the seminar and experiential learning format to support student learning and career prospects.

#### 5. Focus group results

##### 5.1. Seminar model and course structure

Students were asked their perception of the seminar structure of the course and the content as it relates to their broader degree. The major theme elucidated from the focus group was that the course addressed a gap in their degree with respect to operations and applied management. A discussion between two students during the focus group highlighted this gap:

There needs to be more focus on operations. Stay on it. This is the gap that I'm hearing the most. – Student 1

It's the gap that I've experienced. I mean, without this course, I personally think I would be completely unqualified to do any sort of work in urban forestry [or] any sort of consulting work. – Student 2

While two students talked about how their program lacked the "operational aspects of forestry" and "real world context", Student 2 also addressed the role of post-secondary institutions and their foci on theory, rather than operational practice.

[The lacking operations context] is fine from a perspective of university as a means of higher education – philosophy of forestry, for example. And this course acts as a really good, almost in a sense field course, for that operations side [that] would be a core component of urban forestry as far as I can see. – Student 2

##### 5.1.1. Abstract conceptualization

All of the students emphasized the importance of such seminars and courses being taught by people who have real world experience. As described by Student 4, "professors will tell you the theory of how to fell a tree, buck it, and throw it into the chipper. But this was the first course where I heard the instructor say, '...and then get the little straggly twigs left behind on the feed table by feeding a big limb with leaves on to sweep those twigs through the chipper'. I wouldn't have heard that anywhere else".

Students were also happy with the guest lecturers. The diversity of speakers was recognized by two students; Student 7 said that "it was nice hearing from people that aren't part of the white male image of the industry. Just lets me picture myself in the industry better".

##### 5.1.2. Active experimentation

The students also emphasized the importance of learning in a more hands-on environment. Student 3 mentioned a chainsaw breakdown, "you brought in your chainsaw, and we took it apart and you showed us how to use the safety features and how to clean it and stuff like that."

And,

Yeah, it's like, this is an experiential course. This is in lieu of having had the opportunity to go out into the field and learn this stuff. This course addresses the lack of operations content in the program. ... We're learning here in person. – Student 1

Student 7 added that the practical hands-on learning let them see cabling and bracing in person, operate a GNSS receiver, and work with real datasets in ArcGIS Pro. Student 3 mentioned that completing assignments about trees in their community also helped to build interest in the tree; "when you walk by it another day, you're like 'oh, I did a project on this tree'", a sentiment agreed upon by Student 6.

Interestingly, the most discussed active experimentation activity was the Removal Strategy for Trees on a Busy Intersection mock scenario, a minor (2%) component of the course. The students elaborated:

Student 2: When we did the one day where we ended up at the tree with the cable, walking around it and saying, "how would we remove this tree?". I think that is so exactly what we need.

Student 4: Yeah, that was such a good day.

Student 5: That's exactly what I wanted out of this course.

Student 1: That was such a great way to learn. Because people are going through this entire major, not thinking about how the decisions they are making have to be followed through and executed by workers, if it's even possible. And here you get fourth year students saying "okay, we're going to do this tree with the bucket", but there's absolutely no access for the bucket. That's the type of ideas that they need to be introduced to somehow, and you can't do that online.

Student 4: That was such a good day. That was my favorite day ever in courses at UBC.

Student 3: Yeah.

Student 6: Same.

Student 2: 100 percent.

The students also discussed how the budgetary assignments provided them with a better context of the expenses that go into urban forest management. In the words of Student 2, "I think it's bloody expensive now."

The Tree Protection During Construction assignment was appreciated by three students because of the opportunity to work with ArcGIS Pro and relate construction back to large-scale urban forest management. Student 1 also added that, alongside the Tree and Plant Appraisal assignment, they were able to "practice making critical decisions, not just clicking the buttons on a computer to make the things that your teacher told you to come out. I practiced making my own decisions and relying on my own developing expertise." Adding as well that, "if you have a real case study, you think about 'oh, what is the correct way to split the difference between what I need and what's possible, while also keeping costs down and operations running?'"



Student 7 highlighted Student 1's point, adding that "[more] instructions would have given me a boost, but I don't think I would have learned anything if I was just following instructions". Students 2 and 4 agreed that minimal instructing or "handholding" helped them feel more confident doing it themselves.

#### 5.1.3. Reflective observation

Six of the seven students liked the peer evaluation format. Student 4 mentioned how nice it was to "see what other people did for assignments." The students were happy with doing three peer reviews per assignment, the minimum per university policy, but considered five to be a lot. Student 3 suggested that additional participation points for leaving detailed comments while doing peer evaluations would provide "a little more incentive to leave feedback."

Five students expressed that post-assignment discussions in the classroom were beneficial, particularly in being able to present or share solutions for solving a problem. This was evident in discussing approaches to the Removal Strategy for Trees in a Small Municipality where students opted to use goats, sell the wood chips, or allow community members to harvest Christmas trees. "All such cool, creative stuff that I wouldn't have thought about. It was neat to hear from the other people", said Student 4. Student 1 added that,

We all come from different backgrounds in forestry. We have fire-fighting, we have people who tree planted, and we have people who worked in urban forestry. Our solutions differed based on where we come from. Those collaborative discussions come with that opportunity to say well, this is how we would do it in wildland firefighting. Coming from the urban side, I would never have come up with some of these solutions before, but now I can bring those to the table where they might be useful. – Student 1

The students all agreed that reflecting on the course and urban forestry in general through writing an arborist article for a trade journal or magazine was beneficial. Student 4 said that "I liked it a lot as an assignment because it showed writing these articles isn't actually that scary, or that what you're doing can be quickly applied to the industry", a statement that resonated with Student 6. Student 1 credited the course for helping them feel comfortable with writing an article again in the future: "Credit to you, I probably never would have written an article for an arborist magazine had we not had that assignment and now I'm like, oh, I can do this. Yeah, I can do it".

Interestingly, only four of the seven students said that they planned to submit the article to a magazine. The three students who said that they didn't want to submit their articles said that they would have preferred to be given a topic to write about, rather than having to select their own topic. One student said that they felt that their topic was not "super inspired".

#### 5.1.4. Concrete experience

All seven students agreed that live cases were a beneficial experience and contributed towards their comfort in consulting and management after graduation. While capstone courses have conventionally separated the students from the end user or client, three students emphasized that engaging with the Rightsholders (clients) was a valuable part of the live cases. Student 5 offered a detailed response on this:

We engaged with the stakeholders, and we were able to ask them questions and have a Zoom call. Having that direct connection to the people that were making decisions is awesome. I think it's already cool that these are actual real examples or scenarios that we're planning for. Maybe they'll follow some advice and maybe they won't, but I think the fact that it's a real-life project is really cool. – Student 5

Students 3 and 5 both thought that even further opportunities to interact with the stakeholders would be beneficial and should be emphasized as a "massive point" in the live cases.

Students 1 and 4 suggested that the live cases could take place over the duration of the semester where each week focuses on a management issue that is relevant to the case study such that, "over the course of the semester, we would build our case study up through the different units to a final finished product where we understood every single component in-depth" (Student 1).

Student 1 also thought that it would be beneficial to find a live case where the client would like assistance in writing specifications or contract practices and terms.

#### 5.1.5. Credentialling-inspired exam

Five of the seven students liked the format of the exam, although a sixth student said that select multiple answers-type questions were difficult to logic one's way through. In response, Students 3 and 7 suggested that the exam could be converted to module quizzes to reduce the burden of the exam at the end of the year. Said Student 3, "I think that works well, because then you're writing a quiz every three to four weeks, and you're reviewing the materials from those past few weeks. That's personally easier for me and a good way to learn". Student 4 added that, "it doesn't mean it has to be a super easy quiz. It can still require thought, but that is my preferred method for sure."

Six of the seven students mentioned in their responses that the format of the exam was beneficial in helping them prepare for the ISA exam. Student 6 said that "I do think this helped me prepare for the ISA exam", to which Student 4 added, "without a doubt".

#### 5.1.6. Shifts in perceptions of arboriculture and urban forest management

The students also emphasized that they had a greater appreciation for the role of arborists within urban forest management. Adding to Student 4's point about the chipper from the Abstract conceptualization section, Student 1 said that:

You don't necessarily need to know that nitty gritty if you're going into urban forestry management, but it introduces the idea that there are so many concepts that you haven't learned in school. No matter how much you could have learned in school, there's so many little operational details that need to be factored in that you haven't learned. This course at least opens the door to considering what you don't know. – Student 1

Student 4 reiterated the point that managers should be "open to hearing from operations people, even if they have a different background than you". Student 2 and Student 5 underscored this theme by discussing bucket trucks and chippers, equipment that they didn't feel they had known about before taking the course. Student 5 said that in addition to introducing the equipment used in urban forest management, the course also taught "the reality of arboriculture and urban forest management that we will come into contact with, compared to what we tend to be taught".

Urban forests aren't managed without the arborists. The arborists are the biggest tools in your toolkit as an urban forest manager, and we're not being taught how to work with arborists and operations crews outside of this course. – Student 1

#### 5.1.7. Big takeaways and life after the seminar

Students' big takeaways from the seminar were varied. Students 3, 4, 6, and 7 thought that learning about equipment was "very valuable" to their future careers. Students 1, 2, and 5 thought that working with geographic information systems (GIS) software was the most valuable. Student 2 added that their big takeaway was "how to actually apply the theory that I've been learning."

At the end of the focus group, the students began to discuss where they envision themselves in the future, mixed with a discussion about what *urban* forestry really means and whether an *urban* forester can work in a rural or sub-urban area. Student 5 said that "most of the downtown core is urban [by definition]. As soon as you get into single family homes, it's sub-urban." Student 1 responded that, "that's what

you're managing if you go into a job in urban forestry. There's like four trees to manage downtown".

[Small municipalities] are where good jobs are going to be - where you're able to make the most decisions and actually make a difference in urban forestry. When you go into Toronto, Montreal, or Vancouver, you are becoming a cog in their system and you're going to do things the way that they do it whether you like it or not. You can't make a big fuss, you can be a loud cog, but you're still a cog. But there are cities that are just now starting urban forestry strategies from scratch. – Student 1

Student 4 replied, "those 'from scratch' cities are where I want to go after graduation." "Yeah, that's the plan", said Student 6. Student 1 concluded the focus group with, "those are the places where you can truly make a difference".

## 6. Discussion

Urban forest management comprises an important part of urban governance that necessitates critical thinking and creative problem-solving. Training future urban foresters requires the promotion of a diverse array of skills and a recognition of balancing environmental management necessities with the wants and needs of the community. Urban forestry programs are becoming more common (Elmendorf et al., 2005), but previous studies have emphasized the need to further incorporate operational management, economics, and community engagement into curricula (Elmendorf et al., 2005; Scanlan et al., 2021; Vogt et al., 2016). In post-secondary institutions, these topics can be incorporated through experiential learning, helping students develop independence in evaluating key urban forestry issues and appropriate solutions. In developing and running a seminar-style course on management planning in urban forestry, this paper emphasized experiential learning through both active experimentation and concrete experiences, the latter of which engaged two Indigenous community groups.

### 6.1. Seminar content

The focus group highlighted students' recognition of the course content as being both unique and valuable to their education and fulfilling a gap in their program curriculum. The students in the focus group appear to recognize the issue with the conventional hiring structure of urban forestry that relies heavily on foundational skills being taught in operations sector jobs (e.g., arboriculture, vegetation management, invasive species removal) (O'Herrin et al., 2018). Concerns around job prospects without the operations education was also highlighted by two students who described how they felt that "lots of urban forestry people are graduating, and then they're stuck without jobs ... or they're telling people how to do the operations that they've never understood". Based on the existing literature of conventional career hierarchies and progression in urban forestry roles (O'Herrin et al., 2018), a course structured in this style could also help promote post-secondary institutions as opportunities for professional education in urban forestry.

The seminar also demonstrates the capacity for urban forestry courses to facilitate an appreciation for operational staff. If students are not presented with a realistic portrayal of the arboricultural industry, they are done a disservice as future managers. Arboriculture is a dangerous profession (Ball et al., 2020), and its often-unregulated nature can lead to an "us versus them" mentality that can hinder effective communication and relationships between managers and staff (Bardokjian, 2016). As arboriculture and urban forestry become increasingly distinct, especially with the proposal of new credentials or professional associations (Day et al., 2022), it will become markedly more important to facilitate and promote this critical dialogue about interprofessional collaboration. Past failures to incorporate interprofessional collaboration have already been found in other industries (Khalili et al., 2014),

which can have negative impacts on the delivery of services (Paul & Peterson, 2002). Consequently, education in other professional sectors is increasingly integrating interprofessional education into curricula (Fricke et al., 2022; Wener et al., 2022)

#### 6.1.1. Experiential learning

Experiential learning is comprised of four modes of learning: abstract conceptualization, active experimentation, concrete experience, and reflective observation (Kolb & Kolb, 2005). This seminar decreased the reliance upon lecture-based learning in abstract conceptualization, using lecturing only to introduce new concepts for students. Particularly relevant to managerial professions with limited diversity, such as arboriculture and urban forestry (Johnson, 2022), guest lectures offered an opportunity to increase the visible representation of different demographics within the profession, building upon a previous study that proposed post-secondary urban forestry education as a means of workforce diversification (O'Herrin et al., 2018). Likewise, the engagement with Indigenous groups to help address problem-based questions facilitated student-to-community interactions. Indigenous community engagement in urban forestry is notably lacking across Canada and the United States, and promoting engagement with students and interested communities could encourage greater engagement of Indigenous communities in professional practice. Facilitating collaborations between classrooms and Indigenous community groups can provide beneficial engagement opportunities for students and provide expertise to communities.

Excitingly, student ideas crafted during active experimentation activities were shared in reflective observation through peer-to-peer evaluations and post-activity discussions. This provided a forum through which diverse perspectives and methods for urban forest management could be shared and compared. Peer-based evaluations are comparatively under-discussed in experiential learning literature; however, the mock scenarios and case-based assignments provided room for experimentation. In professional practice, where rigidity and conventional practices can hinder creativity in application, these diverse methods may not otherwise be shared.

Alongside their feelings of increased capacity in urban forestry roles, four students also expressed a newfound willingness to write and contribute articles to trade journals and magazines. Incorporating the dialogue and opinions of early career professionals helps to introduce novel management ideas (Martin et al., 2022). It is recommended that other instructors facilitate student submissions to arboriculture and urban forestry magazines, similar to how undergraduate journals are used in other programs. This feeling of increased capacity is also echoed in the students' perception that the course and exam helped them feel more confident in obtaining the ISA Certified Arborist designation, a common requirement for professionals in urban forestry (Day et al., 2022; O'Herrin et al., 2018).

While this focus group largely presented the highlights of the seminar-structured course, it is not without its critiques that can inform future iterations for instructors interested in pursuing experiential learning as a component of their courses. Firstly, students expressed an interest in engaging more frequently with outside community groups. While this was facilitated through the live case projects at the end of the term, designed to reflect a consulting environment, the students felt that more engagement would be beneficial. Some of these comments may stem from our live-case study projects' engagement with two Indigenous groups as Indigenous urban forestry is underrepresented in the current program curriculum, as is true for the urban forest industry and literature at large (Martin, 2023). This presents the larger learning point, however, that students benefit from interacting with outside community groups from whom they can learn and communicate with. Helping to solve problems for external community groups can therefore be beneficial for both students and the external groups. Course instructors should incorporate community engagement into their program to help students practice their engagement skills and become more comfortable

dialoguing with clients, emphasizing similar calls to educators by Scanlan et al. (2021).

Secondly, students wanted to see more credit for peer evaluation comments. By providing more weighting for the peer evaluation component of assignments, students may be more likely to provide substantive feedback to their cohort. Feedback can have a large role in introducing different ideas to students and promoting critical thinking (Ekahitanond, 2013). Where students had provided more information, the evaluated peer would have a better understanding of opportunities for improvement that may ultimately be considered while managing an urban forest. For future implementations of peer-to-peer evaluations, it is recommended that students receive incentivization marks to contribute thoughtful and substantive comments on other students' work.

### 6.1.2. Limitations and future research directions

The focus group method of program evaluation introduces several biases. Firstly, of the 11 students who enrolled in the class, three were unable to attend the focus group due to prior commitments and one chose not to attend. The resulting focus group may not have been representative of the diversity of views about the course. However, the course itself, as an elective within the urban forestry program, would also be biased in its student participation, thereby influencing the focus group. Additionally, while it was clearly communicated to students that their grades would not be influenced by their participation in the focus group, student responses may be biased as the focus group was hosted by the seminar's coordinator. These points notwithstanding, the focus group contributes beneficial information to urban forestry educators, beginning to address the literature gap on urban forestry education initiatives and opportunities in post-secondary institutions.

Urban forestry is an inter-disciplinary field that requires a well-rounded understanding of both its operational components (arboriculture) and its managerial components, including community engagement and fiscal management (Vogt et al., 2016). In teaching operational management, finances, and community engagement topics - lacking in many other programs (Elmendorf et al., 2005; Vogt et al., 2016) - this course emphasizes the Kolb (1984) experiential learning framework. However, other pedagogical frameworks can be applied to enhance student learning. Future studies should evaluate other pedagogical approaches, especially across other subdisciplines and at various years of study. In addition to evaluating pedagogical frameworks, better understanding student knowledge and perceptions of arboriculture and managerial aspects of urban forestry will help improve programming and, ultimately, the employability of recent graduates.

## 7. Conclusion

Experiential learning helps to emphasize students' capacities and skills in working through problems and developing the normalcy of reflecting upon previous activities (Kolb & Kolb, 2017). This is an important skill for managers who must work through novel scenarios. In supporting students to obtain these skills and teach applied knowledge relevant to their necessary credentials through the lens of management, we can prepare students to be competitive early career professionals with the capacity to be involved in urban forest management departments. As urban forests continue to decline around the world, pressured by intensive urbanization and land use conversion (Esperon-Rodriguez et al., 2022; Nowak & Greenfield, 2018), urban forests need managers who are adaptive and creative, pushing the line on dynamic management solutions. Facilitating experiential learning through seminar-structured courses can help support the creation and sharing of novel approaches that could lead to long-term sustainable management of urban forests in the light of an ever-changing world.

## CRediT Authorship Contribution Statement

**Alexander James Fricke Martin:** Conceptualization, Data Curation, Methodology, Formal Analysis, Writing – review & editing, Writing – original draft, Visualization, Validation, Software, Investigation.

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The author of this program evaluation created and implemented the course described herein.

## Declaration of Competing Interest

The author declares the following financial interests/personal relationships that may be considered as potential competing interests. The author of this program evaluation created and implemented the course described herein.

## Appendix A. Supporting information

Supplementary data associated with this article can be found in the online version at [doi:10.1016/j.ufug.2024.128283](https://doi.org/10.1016/j.ufug.2024.128283).

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