

Developing and piloting a process model for work-integrated learning course co-development

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Despite the recognized value of multidirectional collaboration among workplace partners, faculty, and students, there remains a lack of comprehensive frameworks to guide the co-development of work-integrated learning (WIL) courses that address the needs of all relevant partners. This paper introduces the WIL Co-Development Model, developed through integration of the knowledge-to-action and quality implementation frameworks. The model was pilot-tested in a WIL course context, with iterative refinement informed by qualitative and quantitative data. Preliminary findings indicate the model's potential to enhance student outcomes and support effective course design.

Keywords: Theory, course development, partnership, implementation, education

There is increasing recognition for the importance of integrating experiential learning into course curriculums of higher education institutions (Jackson & Dean, 2023; Smith, 2012). Both students and employers express the need for a university education that aligns learning outcomes with the skills and competencies required to thrive in a work environment post-graduation (Gamble et al., 2010; Smith, 2012). Work-integrated learning (WIL) describes approaches to learning involving the practice of professionally relevant competencies in a real-world context in addition to classroom-based theoretical learning. Desired student learning outcomes of WIL range from technical knowledge, interpersonal skills, and developing proficiency in skills pertinent to a profession (Orrell, 2011). In some countries, the value of WIL is recognized federally, with the 2019 Canadian national budget allocating \$798.2 million for the creation of 84,000 new work placements over the course of the next five years (Department of Finance Canada, 2019, p. 27).

There is an established need for partnership between all relevant partners of a WIL course—students, professors, and workplace partners—in designing learning plans and learning outcomes of the course (Choy & Delahaye, 2011; Coll & Kalnins, 2009; Ruskin & Bilous, 2020). Promoting student autonomy in directing their own goals and outcomes for the course may reinforce a sense of value and commitment in their role with the host-organization (Stirling et al., 2016). For a mutually beneficial WIL experience, the student contribution to the host-institution must also fulfil a recognized need

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(Stirling et al., 2016). Engaging community or industry partners ensure alignment with recognized needs and allows context-dependent challenges to be identified (Choy & Delahaye, 2011; Stirling et al., 2016). Taken together, the involvement of students, community, and workplace partners is a crucial feature of WIL design (Holly, 2014; Mackay et al., 2006; Maclaren & Marshall, 1998).

Despite the widely acknowledged importance of engaging all relevant partners in the creation and continual evaluation of a WIL course, the emergence of WIL in course curricula have exhibited a paucity of evidence-informed guidance for partner engagement and collaborative partnership in WIL design (Lasen et al., 2018; Orrell, 2011; Zegwaard & Coll, 2011). A comprehensive framework that can be used to co-develop WIL courses with student and workplace partners is needed. Ruskin and Bilous (2020) explored the phenomenon of co-creation between three groups in the WIL context and proposed a tripartite-co-creation framework. They posited that students, university faculty, and workplace partners all contribute to the planning and creation of WIL courses through their knowledge and expertise informed by their unique perspectives (Ruskin & Bilous, 2020). Further, a proposed framework of success factors necessary for sustainable WIL relationships has identified trust, clear expectations, and reciprocity as critical to the development of WIL programs—all of which are rooted in partnership between all relevant stakeholder groups (Fleming et al., 2018).

This research aims to build on these pre-existing frameworks by providing a stepwise approach for the implementation of a tripartite model of co-creation and partnership. Specifically, drawing on the knowledge to action (KTA) and quality implementation framework (QIF), this paper presents a practical resource for curriculum design, named the WIL Co-Development Model. This paper first turns to illuminate the value of the two frameworks and their contribution to WIL course development. Next, the consolidated framework is presented including resources for educators. Finally, the findings from a pilot study are analyzed and presented.

THEORETICAL UNDERPINNINGS OF THE WIL CO-DEVELOPMENT MODEL

To take a theory-based approach to collaborative WIL course development, the KTA framework and QIF were synthesized. Higher education courses have previously been conceptualized as a form of knowledge translation, as both involve the deliberate and systematic transfer of evidence and expertise into applied contexts in order to achieve meaningful behavioral, professional, or organizational change (Brawley et al., 2013). The process of curriculum design, delivery, and evaluation parallel the structure of well-established knowledge translation frameworks, positioning these frameworks as a theoretically and practically robust foundation for guiding the co-development of WIL courses. The KTA framework is used to move research-based knowledge into action in practice, policies, and programs (Graham et al., 2006). The KTA is derived from a review of over 60 theories and frameworks to identify key commonalities for systematically influencing change, and has been used in diverse intervention implementation studies including within universities (Field et al., 2014; Graham et al., 2006). The KTA guided the broad phases of the WIL Co-Development Model (Figure 2).

The QIF is based on the synthesis of 25 frameworks to determine the key steps to implementation and has been piloted with two community organizations (Meyers, Katz, et al., 2012). Since its creation, the QIF has been used to guide the implementation of a multitude of projects spanning various disciplines including higher education (Taylor et al., 2017). In particular, there has been precedence for using the QIF to develop a project which facilitated the procurement of clinical placements for allied health students (Taylor et al., 2017). These two frameworks have also been adapted previously to guide co-development of a physical activity (PA) intervention training for clinicians (Ma et al., 2022). The QIF

provided actionable steps within the broad phases of the WIL Co-Development Model.

WORK-INTEGRATED LEARNING COURSE CO-DEVELOPMENT PROCESS

An environmental scan of post-secondary course curricula in Canada allowed for the identification of a potential gap in the University of British Columbia (UBC) Kinesiology curriculum and additional services needed at the Physical Activity Research Centre (PARC). PARC is a community-based exercise facility that provides individuals with spinal cord dysfunction (e.g., spinal cord injury, multiple sclerosis, post-polio syndrome), with adaptive fitness equipment and PA guidance from staff and volunteers. Subsequently, meetings were undertaken with faculty, students, PARC staff, and PARC community members to determine the need for a WIL course jointly delivered by UBC and PARC.

Following the scan and stakeholder meetings, the WIL Co-Development Model was piloted in the development of a WIL course set at PARC. In this model of WIL Co-Development, the community engaged as the workplace partner includes PARC members and the PARC staff (manager and supervisors) responsible for the day-to-day operations of PARC. The WIL course was implemented in partnership with the UBC School of Kinesiology.

An advisory group was established consisting of representatives from all partner groups. Focus groups, surveys, and interviews were administered to assess local needs and supports. Notably, these co-development activities facilitated iterative improvements to the WIL Co-Development Model. The aforementioned co-development activities are further elaborated upon and contextualized in the WIL Co-Development Model detailed in Appendix A.

PARC WIL Course

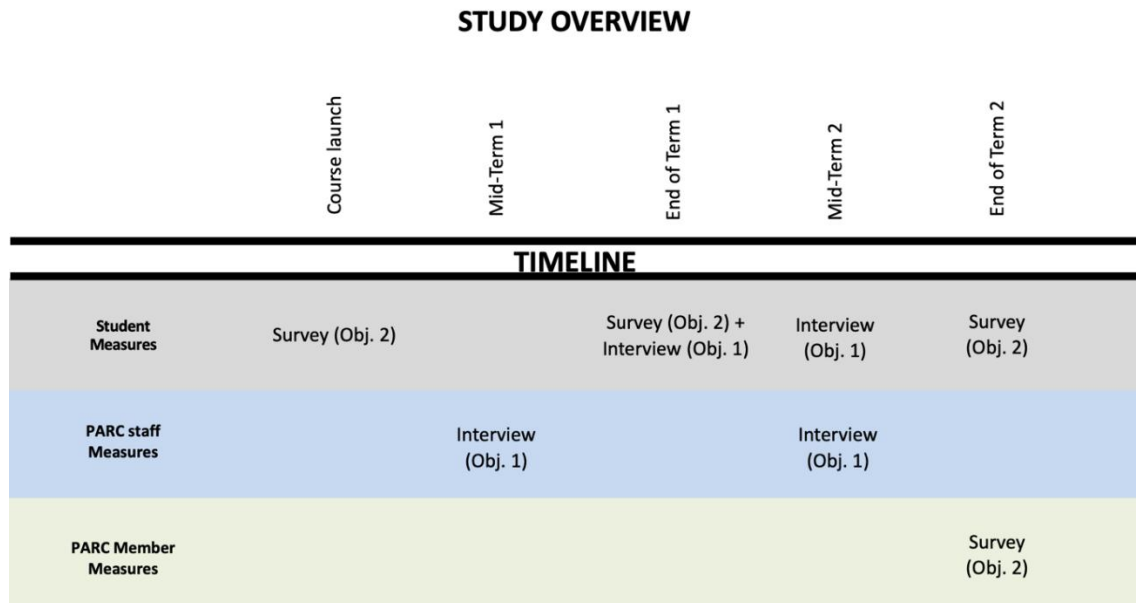
The curriculum was developed to address the needs and objectives identified by faculty, students, and the organization during the co-development process. The course consisted of six experiential learning hours at PARC every week to accumulate a total of 158 practicum hours over two semesters. Academic modules were comprised of recorded lectures and seminars with discussions and practical skill practice. Quality mentorship has been identified as a key element of structured work experience in higher education to facilitate positive learning (Jones, 2007; Stirling et al., 2016). Accordingly, WIL students were paired with a kinesiology graduate student mentor to provide feedback and demonstrations of skills critical for their practicum. Evaluation activities included reflective practice writing prompts, a group project involving the creation of quality improvement plans for PARC, and the development of an exercise prescription for a PARC member.

METHODS

Study Design and Procedure

The effect of the PARC WIL course on students' perceived skills related to exercise prescription and counselling was examined using a repeated measures design (Figure 1). Student surveys were administered online at three timepoints: before course launch, end-of-term one, and end-of-term two. PARC members' perceptions of WIL students' abilities were assessed using a cross-sectional survey at the end-of-term two. Semi-structured interviews were conducted with students (end-of-term one, mid-way term two) and staff (mid-way term two). This study was conducted in accordance with the Declaration of Helsinki, the protocol was approved by the UBC Behavioural Research Ethics Board (H22-02952). Informed consent was obtained from each participant.

FIGURE 1: Study procedures.



Note. Obj. = Objective

Participants

PARC members and WIL students were recruited through email from PARC and UBC respectively, in Vancouver, Canada, from September 2022 to November 2022. PARC member inclusion criteria were 1) individuals with spinal cord dysfunction, 2) current PARC members, and 3) actively using PARC WIL services. These members served as the clients within the WIL course context, receiving student-delivered exercise prescription and physical activity counselling support. Inclusion criteria for PARC staff were those who were 1) currently employed by PARC and 2) have had direct contact with PARC WIL students. Inclusion criteria for WIL students were: (1) they must be enrolled in at least their third year within the UBC Kinesiology program, (2) be in good academic standing with a sessional average of $\geq 60\%$ and fail no more than 6 credits, and (3) complete co- or pre-requisites in exercise prescription. Based on a previous evaluation of students' perceived skill performance before and after a WIL course, a large effect size was expected (Cohen's $d = 1.06$) (Jackson, 2013). A total sample size of 10 was needed to have 80% power to detect a large effect at $p < 0.05$ (Jackson, 2013).

Informant Interviews with PARC Staff and WIL Students

Prior to the interview, participants were asked to review a timeline of co-development activities used to develop and deliver the course. Interview questions probed strengths and weaknesses of designing and delivering the course using the WIL Co-Development Model. Recordings of interviews were transcribed verbatim and deidentified using pseudonyms. Content analysis of the transcripts was conducted, and frequencies of categories were recorded. Review of the resulting categories with participants was completed to help ensure that partner feedback was accurately interpreted, and modifications to the WIL Co-Development Model were reflective of the findings (Ramanadhan et al., 2021).

Survey Measures

All survey items were assessed using a 7-point Likert response scale ranging from 1=strongly disagree to 7=strongly agree. Survey items were designed to assess students' perception of their own skills outlined by the learning objectives. Survey questions were also developed iteratively with the PARC WIL Advisory group to ensure alignment with organizational needs and priorities. In addition to questions pertaining to perceived skills and training, end-of-term one and term two surveys also included survey items informed by Smith's (2012) framework to evaluate the quality of WIL curricula (Smith, 2012). Smith's framework operationalized six domains essential to quality WIL curricula: authenticity, alignment of teaching and learning activities and assessment with integrative learning objectives (TLA), alignment of assessments with integrative learning objectives (AST), integrated learning support, supervisor access, and induction and preparation processes (IPP). Smith et al.'s (2012) instrument for evaluating the quality of WIL curricula was adapted to evaluate the PARC WIL course (refer to Appendix B for modifications). Support for the survey instrument's discriminant validity and utility across different disciplines has previously been demonstrated in a wide range of university specialties involving WIL placements (Smith, 2012). The PARC member survey items were congruent with student surveys, with the survey items assessing perceptions of skills and competencies from the perspective of the PARC members. All surveys were completed online using Qualtrics.

Statistical Analyses

For student surveys, repeated measures ANOVA was conducted to examine the effect of time on participants' mean scores of perceived skills across three timepoints: baseline, post-term 1, and post-term 2. The alpha level was set at 0.05 for all tests. Partial eta squared (η_p^2) was reported as a measure of effect size. Where a statistically significant main effect was found, pairwise comparisons with Bonferroni-adjusted alpha levels were performed to identify the specific timepoints differences occurred. Descriptive statistics were used to present the findings for the cross-sectional PARC member survey. Cronbach's α of >0.90 for survey items in perceived skills and course satisfaction warranted the aggregation of scores for use in the analyses of the respective domains. High internal consistency within the domains of Smith's instrument for evaluating WIL curricula have been demonstrated previously (Smith, 2012).

RESULTS

PARC WIL Co-Development Model Description

The resulting WIL Co-Development model is comprised of 10 broad phases (Figure 2) that are subdivided into 28 specific actionable steps (Table 1). These phases and steps are summarized with applications of the steps detailed using the PARC WIL course as an example (Appendix A). Below, the broad phases of the model are described. These descriptions serve to provide guidance for what each phase might include but are intended to be tailored for each WIL course.

FIGURE 2: WIL Co-Development Model overview of phases.

Work Integrated Learning Co-Development Framework*Phase 1. Knowledge synthesis*

Knowledge synthesis refers to the consolidation of pre-existing knowledge to provide a unified understanding of current literature (Graham et al., 2006). Reviewing the current curriculum allows for the recognition of gaps in curricular components. Identifying trainings provided by the partner organization highlights existing supports for student learning and reveals gaps where additional resources may be needed. The optional step of identifying learning objectives, content, and evaluations covered across other universities or in the literature enables broader characterization of the specific training/learning objectives that may be needed in the course. The faculty lead may also engage in communities of practice or solicit guidance from other institutions and faculty members in this phase. As in the KTA, this phase can be completed at the beginning or continued throughout the remaining phases as needed.

Phase 2. Identify a WIL team

A WIL team may consist of faculty and workplace partner leads, an implementation team, content area experts, and other relevant decision-makers. Those included should reflect expertise and experience in academic content, skill delivery, familiarity with operations, or any other activities relevant to the delivery and participation of the course. Identifying and recruiting workplace partner decision-makers is essential for integrating local knowledge and identifying context-dependent facilitators or barriers for WIL implementation. The structure of the team overseeing implementation will vary depending on the academic institution and host-organization. Finally, specific roles and responsibilities should be discussed and outlined for each team member suitable to their expertise, knowledge, and available time. Documentation and review of these roles and responsibilities can facilitate accountability among the team. These roles and responsibilities may involve prospective WIL student selection, training, evaluation, monitoring, and logistical support.

Phase 3. Foster meaningful partnership engagement

Establishing practices for meaningful partnership engagement and shared decision-making is essential to fostering the multidirectional collaboration necessary for a successful WIL course. Processes supporting these principles should be discussed and clearly defined. For example, identifying the

benefits and goals for both the academic and community partner, meeting logistics and timelines that value partner preferences and availability, additional supports or training needed for all parties to participate to the full extent, and providing compensation/recognition for contributions (Hamilton et al., 2018; Hoekstra et al., 2020).

Phase 4. Problem identification/assess barriers & facilitators

WIL should bring benefits to all relevant partners of the course, including the workplace partner. This step identifies how services provided by WIL students can meet the needs of the workplace partner and provide meaningful contributions. Additionally, context-dependent barriers and facilitators to course implementation should be identified through either formal data collection or informal communication with workplace staff, faculty, students, and participants who use the services provided by WIL students (if applicable).

Phase 5. Identify, review, select course learning objectives

Specific learning objectives and needs for the course should be triangulated through findings from the partner engagement process (Phase 4) and knowledge synthesis (Phase 1) (Buchanan et al., 2022). Consider reviewing how these learning objectives fit within the broader scope and sequence of the programmatic curriculum (i.e., beyond the individual course) and policies outlined for WIL within the specific institution.

Phase 6. Adapt course to local context

Finalize learning objectives, evaluations, and course content. Important considerations include opportunities for partners to provide feedback on the course syllabus, and that course content/evaluations align with both the course learning objectives and the needs of the workplace partner. The roles and responsibilities, timelines, and oversight of students should be discussed amongst those involved in course delivery.

Phase 7. Select, tailor, implement course

This step takes into consideration course creation activities specific to the institution (e. g., course review and approval, course registration). A timeline detailing required actions and roles such as institutional approval, advertisement of course to students, review and selection of student applications, and host-organization preparation for WIL students, should be established.

Phase 8. Faculty-organization ongoing communication

Maintaining ongoing communications with the workplace partner about course implementation to ensure that any barriers or concerns can be addressed as they arise.

Phase 9. Evaluate course effectiveness

Assess the ability of the WIL course to meet the learning objectives, learner satisfaction, or other relevant outcomes. Any adaptations that are made throughout course maintenance should be documented.

Phase 10. Sustain course offering

Iteratively refine the course to maintain course implementation long-term. This may involve revisiting the previous phases.

TABLE 1: WIL Co-Development Model checklist.

Phase	Action steps	
Knowledge synthesis	Identify current curriculum	☐
	Identify current partner trainings	☐
	Identify curriculum and teaching/learning best practices from other universities or in the literature	☐
Identify a WIL team	Identify WIL team faculty and community partner leads	☐
	Identify and recruit content area specialists as team members/consultants (e.g., faculty/staff, students)	☐
	Identify and recruit organization or community partner decision-makers as team members/consultants (e.g., site leads and employees, organization members/participants who use the service)	☐
	Decide on structure of team overseeing implementation (e.g., steering committee, advisory board, community coalition, workgroup, etc.)	☐
	Discuss and assign team members roles, processes, and responsibilities	☐
Foster meaningful partnership engagement	Establish practices for meaningful partnership engagement and shared decision-making. For example, discussing core components of meaningful engagement (e.g., mutually beneficial, supports needed, expertise to share, valuing contributions/compensation), creating policies or strategies that enhance accountability to action on feedback, discussing meeting logistics and timelines, and emphasizing the iterative nature of communication and feedback	☐
Problem identification/ Assess barriers/ facilitators to course implementation	Identify the perceived need for the WIL program within the organization/community and how the WIL program can address these needs	☐
	Identify the barriers and facilitators to course implementation. Example modes of collection: Surveys, interviews, focus groups, meetings	☐
Identify, review, select course learning objectives	Determine priority needs for training and/or learning objectives from students, participants, faculty, and host organization	☐
	Triangulate with findings from knowledge synthesis phase	☐
	Ensure initial course vision aligns with academic curriculum and WIL policies	☐
Adapt course to the local context	Design course syllabus with appropriate learning objectives, evaluations, course content	☐
	Discuss roles, timelines, and supervision strategies amongst those involved in course delivery	☐

	Create and distribute documentation which outlines roles for WIL students, supervisors, management, and faculty	☐
Select, tailor, implement course	Academic institution activities for course launch completed	☐
	List tasks, roles, and timeline required for course launch (e.g., advertising the course, reviewing applications, selecting and notifying students admitted to the course, and orientation delivery)	☐
	Provide relevant training prior to commencement of course for staff to support WIL students	☐
	Deliver the course	☐
Faculty-organization ongoing communication	Collaborate with partners to address factors impacting quality of course implementation	☐
	Engage in problem solving	☐
Evaluate course effectiveness	Assess extent to which learning objectives are met	☐
	Assess learner satisfaction or other priority outcomes (e.g., course enrollment, specific benefits to the organization partner)	☐
	Document adaptations	☐
Sustain Course Offering	Modify course as needed in response to evaluation and relevant party needs	☐
	Report back to WIL course partners on results of implementation	☐

Semi-Structured Interviews

Semi-structured interviews were conducted in term one with nine students and six staff, and in term two with eight students and six PARC staff to iteratively refine the WIL Co-Development Model. Participants identified several strengths of the framework, including multiple opportunities to provide feedback and seek clarification, responsiveness of the WIL faculty lead to stakeholder input, and the inclusive engagement of all key course partners. Actions identified requiring improvement were earlier and more extensive engagement of middle management whose roles were to directly supervise WIL students and report to the manager, and more comprehensive protocols and documentation for establishing the roles, responsibilities, and expectations of WIL students and workplace supervisors. One PARC staff member expressed: "It would have been nice to be involved in those meetings [between managers and course administrator] and know what our responsibilities are." Participants expressed that the WIL Co-Development Model followed a logical order and agreed the model had potential to be generalizable to other WIL courses. Regarding course development, one student expressed the following: "I really feel heard and...I have a seat at the table." All response themes extracted from participant interviews are included in Appendix C.

Findings: Pilot-Testing the PARC WIL Course

Thirteen PARC members and 10 WIL students were recruited to evaluate the effectiveness of the PARC WIL course to support students' skills of providing exercise counselling and prescription. A repeated measures ANOVA test revealed that the aggregated scores for students' perceived skills and abilities to provide PA prescription and counselling were significantly greater ($p < 0.001$) from $M = 4.247$ ($SD = 0.907$) at baseline, to 6.405 ($SD = 0.587$) after the WIL course, with a medium-large effect size ($\eta_p^2 = 0.879$). Planned contrasts demonstrated significant increases ($p < 0.001$, $\eta_p^2 = 0.790$) between baseline ($M = 4.247$, $SD = 0.907$) and end-of-term one ($M = 5.581$, $SD = 0.893$). Significant increases ($p < 0.001$, $\eta_p^2 = 0.802$) were also observed from end-of-term 1 ($M = 5.581$, $SD = 0.893$) to end-of-term 2 ($M = 6.405$, $SD = 0.587$). Repeated measures ANOVA tests were also conducted for individual survey items across the three timepoints (Table 2). From baseline to post-term 1, 5 out of 15 survey items demonstrated a significant increase in student self-reported skills. From baseline to post-term 2, the same survey items continued to demonstrate significant improvements from baseline with significant increases in 7 additional skills seen. There was no statistically significant increase in students' perceived skills in disability-appropriate communication and reflective practice.

TABLE 2: WIL students' perceived skills to provide exercise prescription and counselling.

Survey Item	Baseline	Post Term-1	Post Term-2	Effect Size (η_p^2) Baseline vs Post Term-1	Effect Size (η_p^2) Post Term-1 vs Post Term-2
1) Identify SCI-specific exercise considerations and how to manage them in the exercise context	3.67 ± 1.87 (2.23-5.11)	$5.12 \pm 1.36^*$ (4.08-6.17)	$6.33 \pm 0.71^{**}$ (5.79-6.88)	0.549	0.641
2) Demonstrate how to use accessible exercise equipment for people with SCI	4.00 ± 1.32 (2.98-5.02)	$6.49 \pm 0.71^*$ (5.95-7.04)	$6.78 \pm 0.44^*$ (6.44-7.12)	0.775	0.169
3) Conduct fitness assessments for people with SCI	2.56 ± 0.88 (1.88-3.23)	$4.15 \pm 1.45^*$ (3.03-5.27)	$5.00 \pm 1.94^*$ (3.51-6.59)	0.56	0.361
4) Modify exercise programs for people with SCI	3.89 ± 1.69 (2.59-5.19)	5.37 ± 1.22 (4.43-6.31)	$6.44 \pm 0.73^{**}$ (5.89-7.00)	0.513	0.703
5) Prescribe personalized exercise programs for people with SCI	2.89 ± 1.76 (1.53-4.25)	4.26 ± 1.48 (3.12-5.40)	$6.33 \pm 0.71^{**}$ (5.79-6.88)	0.486	0.846
6) Coach people with SCI on how to perform exercises correctly	4.11 ± 1.05 (3.30-4.92)	$6.00 \pm 0.87^*$ (5.33-6.67)	$6.44 \pm 0.73^*$ (5.89-7.00)	0.868	0.296
7) Provide PA counselling for PARC participants	3.33 ± 1.50 (2.18-4.49)	$5.24 \pm 1.71^*$ (3.93-6.56)	$6.56 \pm 1.01^{**}$ (5.78-7.34)	0.825	0.568
8) Apply principles of behaviour change and motivational interviewing to support and retain new PARC members	3.89 ± 1.69 (2.59-5.19)	5.02 ± 1.58 (3.81-6.24)	$6.56 \pm 1.01^{**}$ (5.78-7.34)	0.483	0.677
9) Lead an in-person exercise class for people with SCI	4.11 ± 1.45 (2.99-5.23)	4.63 ± 1.50 (3.48-5.78)	$6.11 \pm 1.05^{**}$ (5.30-6.92)	0.261	0.768

10) Lead an online exercise class for people with SCI	3.78 ± 1.48 (2.64-4.92)	5.25 ± 1.92 (3.77-6.73)	6.44 ± 1.01* (5.67-7.22)	0.475	0.372
11) Apply principles of evidence-informed practice to inform exercise prescription and counselling decision-making	4.89 ± 1.69 (3.59-6.19)	5.99 ± 1.58 (4.77-7.20)	6.78 ± 0.44* (5.57-7.22)	0.235	0.265
12) Use appropriate verbal and body language when working with people with disabilities	5.78 ± 1.09 (4.94-6.62)	6.63 ± 0.48 (6.26-7.00)	6.67 ± 0.50 (6.28-7.05)	0.463	0.006
13) Feel comfortable maintaining good conversation and company with a wide variety of PARC participants	6.33 ± 1.00 (5.57-7.10)	6.88 ± 0.33 (6.62-7.13)	6.89 ± 0.33 (6.63-7.15)	0.391	0.001
14) Refine my own practice in prescription, counselling, and coaching through reflective practice	5.44 ± 1.33 (4.42-6.47)	6.25 ± 0.66 (5.74-6.76)	6.67 ± 0.50 (6.28-7.05)	0.251	0.440
15) Contribute to my place of work by identifying and mobilizing changes that improve the work environments and/or services offered	5.22 ± 1.39 (4.15-6.29)	6.00 ± 0.87 (5.33-6.67)	6.44 ± 1.01* (5.67-7.22)	0.419	0.296

Note. Data are presented as mean ± standard deviation (95% confidence interval) on a 5-point Likert scale (1 = strongly disagree to 5 = strongly agree).

Abbreviations: ANOVA=analysis of variance; η^2 =partial eta squared; SCI=spinal cord injury.

* $p < 0.05$; indicates significant difference from baseline.

† $p < 0.05$; indicates significant difference from Post Term-1.

Students initially agreed that they were satisfied with the course by the end of term one, though the degree of satisfaction increased significantly by the end of term 2 ($M=5.67 \pm 0.65$; $M=6.73 \pm 0.34$, $p < 0.001$, $d=0.56$). Paired samples t-test analysis of Smith's Quality WIL evaluation domains indicated a significant increase in scores for all domains except for supervisor access from post-term-1 to post-term-2 which remained high (Table 3).

TABLE 3: Ratings of quality of WIL curricula.

Quality of WIL Curricula Domain	Post Term-1	Post Term-2	Effect Size (Cohen's d)
Authenticity	5.56 ± 0.75 (5.02-6.09)	6.62 ± 0.55 (6.22-7.01)*	0.380
Alignment of teaching and learning activities with integrative learning objectives	6.07 ± 0.58 (5.65-6.48)	6.74 ± 0.45 (6.41-7.06)*	0.370
Alignment of assessment with integrative learning objectives	5.78 ± 1.04 (5.03-6.52)	6.53 ± 0.85 (5.92-7.14)*	0.627
Supervisor access	6.82 ± 0.23 (6.65-6.98)	6.87 ± 0.32 (6.64-7.10)	0.432
Induction and preparation processes	4.98 ± 1.00 (4.26-5.70)	6.08 ± 0.91 (5.43-6.73)*	0.798

Note. Values are means ± SD (confidence intervals).

*p<0.05; indicates significant difference from baseline.

Cohen's d: d=0.2 for small effect, d=0.5 for medium effect, and d=0.8 for large effect.

Fifteen PARC members, who were direct recipients of services provided by WIL students, responded to the PARC member survey. The results demonstrated high ratings for skills of PARC WIL students to provide exercise prescription and counselling (Table 4).

TABLE 4: PARC member perceptions of WIL students' skills.

PARC Member Survey Items	Post Term- 2
Identify SCD-specific exercise considerations and how to manage them in the exercise context	6.18 ± 0.41 (5.91-6.45)
Demonstrate how to use accessible exercise equipment for people with SCD	6.60 ± 0.51 (6.32-6.88)
Conduct fitness assessments for people with SCD	6.07 ± 0.70 (5.68-6.46)
Modify exercise programs for people with SCD	6.40 ± 0.51 (6.12-6.68)
Prescribe personalized exercise programs for people with SCD	6.13 ± 1.06 (5.55-6.72)
Coach people with SCD on how to perform exercises correctly	6.47 ± 0.52 (6.18-6.75)
Provide physical activity counselling for PARC participants	5.50 ± 1.79 (4.47-6.53)
Apply principles of behaviour change and motivational interviewing to support and retain new PARC members	5.75 ± 0.97 (5.14-6.36)
Lead an in-person exercise class for people with SCD	6.25 ± 0.71 (5.66-6.84)
Lead an online exercise class for people with SCD	6.00 ± 1.27 (4.67-7.33)
Use appropriate verbal and body language when working with people with disabilities	6.40 ± 0.63 (6.05-6.75)

Note. Values are means ± SD (confidence intervals).

DISCUSSION

This work proposes a model for co-developing WIL courses with workplace and student partners. The model applies a knowledge translation and implementation science model and framework to the education context, summarizing actionable steps for moving from evidence synthesis of curricula through to course adaptation, implementation, evaluation, and sustainment. The WIL Co-Development Model supported the development and delivery of a WIL course that increased the perceived skills of students to provide exercise counselling and prescription services for individuals with SCD. Satisfaction and WIL quality were rated highly, further supporting the effective development of this course guided by the WIL Co-Development Model.

There was a significant increase in aggregate and individual items assessing students' perceived skills. This finding reflects those found in previous studies, where partaking in WIL courses significantly increased students' perceived skills related to employability (Jackson, 2013; Lim et al., 2020; Reddan, 2016). For example, Jackson (2013) found similar increases in perceived skills such as professionalism, communication, and problem-solving following a WIL placement, though only skill improvement between two timepoints were compared. Gilbert (2014) analyzed self-evaluations at three timepoints similar to this study, but found that there were no skills besides general knowledge of the content area that underwent significant increases continuously at both baseline to midyear, and midyear to end-of-year periods (Gilbert et al., 2014). The pilot study found that item scores for student's perceived skills of managing SCI-specific exercise considerations and PA counselling continued to increase from baseline to end-of-term one, and end-of-term one to end-of-term two. These findings may suggest the continued benefits of an iterative co-development process. The cyclic process of receiving feedback and actioning on the feedback may have enabled the introduction of improved learning opportunities for students to engage in, which promoted their perceived ability to work with individuals with SCD. For example, it was recommended during mid-term interviews that middle management (i.e., personnel directly providing supervision to WIL students) be engaged in the WIL design and delivery process. Engagement of these individuals resulted in changes to performance evaluation forms provided to students. Based on WIL student feedback, there were also changes to seminar structures and assessment strategies. Additional mentorship touchpoints were also added to support students in completing their graded assignments. The iterative design process of the curriculum guided by the WIL Co-Development Model may have facilitated the continued increases in perceived skills throughout both semesters.

There was also a significant increase in all except one domain of the quality assessment of WIL curriculum from term one to term two. The supervisor access domain did not change significantly over the delivery of the course. This is likely a result of a ceiling effect as supervisor access was already assessed to be high in term one. Although there have been few studies that have evaluated the quality of WIL curricula, the use of Smith's (2012) framework for assessing WIL quality were heterogeneous across studies which posed a challenge in contextualizing our findings. For example, Smith et al. (2019), used the instrument domains cross-sectionally to compare various conditions of WIL placements, while Kiriri (2019) employed the evaluation instrument as a singular cross-sectional measure on a 5-point survey scale (Kiriri, 2019; Smith et al., 2019). Nonetheless, the increase in quality of WIL curriculum quality observed from term one to term two may signify the importance of engaging with an iterative co-development process to address course barriers and facilitators as they arise.

The WIL Co-Development Model provides some unique contributions to the current body of WIL literature. First, the WIL Co-Development Model addresses the paucity of structured strategies for

promoting the involvement of partners in the creation and delivery of WIL courses, despite the recognized importance of relevant partner collaboration in WIL (Orrell, 2011; Stirling et al., 2016; Zegwaard & Coll, 2011). Moreover, the advantages of partner involvement that have been identified in WIL literature extends beyond its initial implementation. Ensuring meaningful partner engagement throughout design, implementation, and evaluation is likely to promote sustainability as the outputs of the program better match the organizational needs (Craig et al., 2008; Greenhalgh et al., 2004). The involvement of the workplace partner, faculty members, WIL students, and the individuals who directly use the services provided by the WIL students provides an opportunity for the WIL course to deliver meaningful and reciprocal experiences for all involved parties.

Second, the WIL Co-Development Model is grounded in theory. The KTA and the QIF have been widely used in the fields of knowledge translation and implementation science. Implementation of complex and multifactorial programs is typically more effective when rooted in theory (Craig et al., 2008). Resultantly, there has been burgeoning use of the KTA and QIF frameworks to guide educational interventions. For example, the KTA and QIF have previously been adapted to support the implementation of a physiotherapist training intervention to provide PA coaching for individuals with spinal cord injury (Ma et al., 2020, 2022; Shu et al., 2022). The physiotherapist training intervention guided by the KTA and QIF improved PA coaching determinants such as knowledge and skills (Shu et al., 2022). The adaptation of the KTA and QIF to the WIL context presents a promising approach for incorporating both knowledge translation/implementation science and educational research. The WIL Co-Development Model bridges the gap between these fields to address an unmet need in supporting the active participation of all partner groups in developing and implementing WIL courses.

LIMITATIONS

Our examination of changes in perceived skills is limited to a sample of 10 students within a single WIL site where demographic information was not collected. It is therefore difficult to make claims on the representativeness of this sample. In future work, it would be prudent to examine the diversity of included students across different contexts. There was no comparison condition within our intervention to determine whether the WIL Co-Development Model was more effective than other methods of WIL course development. Previous studies that have measured perceived skills in students did not report effect sizes and used different scale measures and timepoints, precluding our ability to make comparisons (Jackson, 2013; Lim et al., 2020; Reddan, 2016). The generalizability of the WIL Co-Development Model to other contexts is also currently unknown; this framework should be assessed across diverse settings and partners. However, partner feedback provided during semi-structured interviews suggested that the respondents perceived that the framework holds potential to be adapted to other settings and partner groups. Perspectives on the logical order and generalizability of the WIL Co-Development Model were not elicited from all participants. Future research will examine the use of the WIL Co-Development Model in the development and delivery of other WIL courses. We recommend the examination of all relevant partner experiences in course design across diverse WIL settings to better understand the generalizability of this model.

CONCLUSION

To our knowledge, the WIL Co-Development Model is the first model to provide a systematic, stepwise, and theory-based approach to collaborative partnership in the design and delivery of a WIL course. Pilot testing demonstrated improved perceived PA prescription and counselling skills among students who received the WIL course guided by the WIL Co-Development Model, showing preliminary

support for its effectiveness. The model borrows from theory in implementation science which highlights potential future opportunities to collaborate with fields complementary to education, and potentially vice versa. The authors welcome feedback on the model for future iterations that continue to support meaningful co-development of WIL courses.

AUTHOR CONTRIBUTIONS

Kawami Cao and Jasmin Ma contributed as co-first authors

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APPENDIX A: WIL Co-Development Model and example applications.

Phase	Action steps	Application to PARC WIL
Knowledge synthesis	Identify current curriculum	Authors CA and JM were collaborators on an environmental scan that reviewed post-secondary course curriculums and exercise certification courses in Canada related to PA prescription and counselling for people with disabilities. These findings were compared with the current UBC Kinesiology curriculum and services offered at PARC. The faculty lead also engaged in an ongoing community of practice with other universities offering university-based exercise programs for individuals with disabilities.
	Identify current partner trainings	
	(optional) Identify curriculum and teaching/learning best practices from other universities or in the literature	
Identify a WIL team	Identify WIL team faculty and community partner leads	Instructor currently teaching content in content area identified as faculty lead. PARC manager identified as organization partner lead.
	Identify and recruit content area specialists as team members/consultants (e.g., faculty/staff, students)	Student representatives were recruited to the team and faculty external to the university were consulted to contribute content.
	Identify and recruit organization or community partner decision-makers as team members/consultants (e.g., site leads and employees, organization members/participants who use the service)	PARC managers and PARC members with SCD were identified and recruited.
	Decide on structure of team overseeing implementation (e.g., steering committee, advisory board, community coalition, workgroup, etc.)	PARC WIL advisory group was established with faculty and organization co-leads. PARC members and students acted as advisory group members.
	Discuss and assign team members roles, processes, and responsibilities	Community/organization employees (i.e., supervisors) were added in term 2 based on feedback.
		First PARC WIL advisory group meeting discussed specific roles. These roles were summarized in a shared document and

		circulated for iterative feedback and reference.
Foster meaningful partnership engagement	Establish practices for meaningful partnership engagement and shared decision-making. For example, discussing core components of meaningful engagement (e.g., mutually beneficial, supports needed, expertise to share, valuing contributions/compensation), creating policies or strategies that enhance accountability to action on feedback, discussing meeting logistics and timelines, and emphasizing the iterative nature of communication and feedback	A planning meeting was held with the PARC WIL advisory group to discuss partnership principles guided by the Patient Engagement In Research Framework (PEIR; though originally designed for patient partnerships, it encompasses a diverse range of partnership engagement theories, models, and frameworks; Hamilton et al., 2018; Hoekstra et al., 2020). The PEIR framework's seven identified themes for meaningful engagement were used to guide an initial conversation about what the partnership could look like (Hamilton et al., 2018).
Problem identification/ Assess barriers/ facilitators to course implementation	Identify the perceived need for the WIL program within the organization/community and how the WIL program can address these needs	Meetings were held with PARC decision-makers to identify needs for the PARC WIL course, potential barriers and facilitators to implementation, and outline the institutional standards for WIL course requirements.
	Identify the barriers and facilitators to course implementation. Example modes of collection: Surveys, interviews, focus groups, meetings	Surveys were conducted with PARC members and PARC volunteers to assess current training received and additional supports needed to prescribe and counsel PA. Focus groups with both PARC members and volunteers were conducted to disseminate survey results back to partners and refine the understanding of local needs.
Identify, review, select course learning objectives	Determine priority needs for training and/or learning objectives from students, participants, faculty, and host organization	Course learning objectives were selected based on the environmental scan, knowledge gained from the faculty lead's participation in a community of practice, and the results from the above co-development processes including the PARC WIL advisory group meetings, PARC member and volunteer surveys, and focus groups.
	Triangulate with findings from knowledge synthesis phase	
	Ensure initial course vision aligns with academic curriculum and WIL policies	Proposed learning objectives were reviewed for fit and scope and

		sequencing within the broader Kinesiology curriculum and checked for alignment with departmental standards for WIL.
Adapt course to the local context	Design course syllabus with appropriate learning objectives, evaluations, course content	Feedback from the PARC WIL advisory board was sought on a draft of the course syllabus. In alignment with selected learning objectives, course evaluations were appraised for their suitability to meet organization partners' needs, and course content was reviewed to ensure students had adequate training to meaningfully participate in the work environment.
	Discuss roles, timelines, and supervision strategies amongst those involved in course delivery	
	Create and distribute documentation which outlines roles for WIL students, supervisors, management, and faculty	Supervision and evaluation roles were agreed upon and summarized in a shared document.
Select, tailor, implement course	Academic institution activities for course launch completed	Course syllabus was reviewed by the undergraduate committee and passed by Senate.
	List tasks, roles, and timeline required for course launch (e.g., advertising the course, reviewing applications, selecting and notifying students admitted to the course, and orientation delivery)	The PARC WIL advisory board created an application for WIL admissions, and the course was advertised to students. The PARC WIL advisory board were given at least two weeks to review applications. A final meeting to discuss applications was held and offers of admission to students were sent out prior to course registration.
	Provide relevant training prior to commencement of course for staff to support WIL students	Training of supervisors to support WIL students on-site was provided. Course was delivered.
	Deliver the course	
Faculty-organization ongoing communication	Collaborate with partners to address factors impacting quality of course implementation	Ongoing communications via email and meetings relayed WIL student and PARC staff experiences and needs.
	Engage in problem solving	A PARC member coffee social was held to share information about the PARC WIL

		course and address questions and feedback.
Evaluate course effectiveness	Assess extent to which learning objectives are met	Surveys at three timepoints evaluated the perceived skills of students to provide exercise counselling and prescription for PARC members with SCD.
	Assess learner satisfaction or other priority outcomes (e.g., course enrollment, specific benefits to the organization partner)	A PARC member survey at the end of term 2 assessed satisfaction with the PARC WIL program. Interviews were conducted to seek students and PARC staff feedback and effects of WIL.
	Document adaptations	Suggestions for improvement were documented in an ongoing task list to ensure recommendations were addressed immediately or for the next intake.
Sustain Course Offering	Modify course as needed in response to evaluation and relevant party needs	An annual review of course delivery and evaluation findings is conducted at the end of the course.
	Report back to WIL course partners on results of implementation	Action items for next year are defined and implemented prior to the next cohort.

Adapted from the KTA and QIF (Graham et al., 2006; Meyers, Durlak, & Wandersman, 2012; Meyers, Katz, et al., 2012). See Table A for a checklist version.

APPENDIX B: Modifications to Smith's (2012) evaluation tool for quality of WIL curricula.

AST3	Removed due to ambiguous wording and similarity in scope to AST2.
IPP1 X; IPP2 X	These two survey items which were related to the allocation system between students and workplaces were excluded as it was not relevant to the PARC WIL course.
ILS	The importance of the integrated learning support domain within Smith's framework lies in the presumption that students in WIL placements are not at their host universities. Given that support services were the same for (DEIDENTIFIED FOR REVIEW) and PARC as it is an affiliated institution, this domain was not relevant to include.

APPENDIX C: Semi-structured interviews for iterative refinement of model.

Examples of what worked well		# of Respondents	
Interviews		6	
Instructor actioning on feedback		5	
Lots of opportunities to provide feedback		3	
Openness to feedback		2	
Surveys		1	
Instructor and supervisors being approachable		1	
Specific roles sheet		1	
PARC members as part of the selection committee for admissions to WIL		1	
Feedback was taken seriously		1	
Collaborating with community members identifies context-dependent needs		1	
Could have used more guidance on how to supervise in term 1		1	
Examples of what could be improved		# of Respondents	
Clearly establish expectations and responsibility of all roles		6	
Meeting or briefing for PARC supervisors in beginning of year		3	
Students on the WIL advisory board		2	
Social event at the beginning of the year for PARC members and students		2	
Supervisors could have used more guidance on how to supervise in term 1		1	
Roles sheet		1	
Agreed the process was good, but there will be a new manager to consider		1	
Anonymous forms to contact course instructor		1	
Report back to partners on results of data collection		1	
Logical order		Generalizability	
Positive	7	Positive	10



About the Journal

The International Journal of Work-Integrated Learning (IJWIL) publishes double-blind peer-reviewed original research and topical issues related to Work-Integrated Learning (WIL). IJWIL first published in 2000 under the name of Asia-Pacific Journal of Cooperative Education (APJCE).

In this Journal, WIL is defined as:

An educational approach involving three parties – the student, educational institution, and an external stakeholder – consisting of authentic work-focused experiences as an intentional component of the curriculum. Students learn through active engagement in purposeful work tasks, which enable the integration of theory with meaningful practice that is relevant to the students' discipline of study and/or professional development (Zegwaard et al., 2023, p. 38).*

Examples of practice include off-campus workplace immersion activities such as work placements, internships, practicum, service learning, and cooperative education (co-op), and on-campus activities such as work-related projects/competitions, entrepreneurship, student-led enterprise, student consultancies, etc. WIL is related to, and overlaps with, the fields of experiential learning, work-based learning, and vocational education and training.

The Journal's aim is to enable specialists working in WIL to disseminate research findings and share knowledge to the benefit of institutions, students, WIL practitioners, curricular designers, and researchers. The Journal encourages quality research and explorative critical discussion that leads to the advancement of quality practices, development of further understanding of WIL, and promote further research.

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Research publications should contain; an introduction that describes relevant literature and sets the context of the inquiry. A detailed description and justification for the methodology employed. A description of the research findings - tabulated as appropriate, a discussion of the importance of the findings including their significance to current established literature, implications for practitioners and researchers, whilst remaining mindful of the limitations of the data, and a conclusion including recommendations.

Topical discussion articles should contain a clear statement of the topic or issue under discussion, reference to relevant literature, critical and scholarly discussion on the importance of the issues, critical insights into how to advance the issue further, and implications for other researchers and practitioners.

Good practice and program description papers. On occasions, IJWIL seeks manuscripts describing an example of good practice, however, only if it presents a particularly unique or innovative practice or it was situated in an unusual context. There must be a clear contribution of new knowledge to the established literature. Manuscripts describing what is essentially 'typical', 'common' or 'known' practices will be encouraged to rewrite the focus of the manuscript to a significant educational issue or will be encouraged to publish their work via another avenue that seeks such content.

By negotiation with the Editor-in-Chief, the Journal also accepts a small number of *Book Reviews* of relevant and recently published books.

Reference

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