

# **An Investigation of Co-operative Education Students' Experiences with an Artificial Intelligence Résumé Critique**



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**CENTRE FOR CAREER ACTION**

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# Executive Summary

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Work-integrated learning (WIL) programs often partner with career services centers to support WIL students throughout the job search process. Résumé critiques are among the most popular career services that WIL students might access. When done right, such critiques can help students identify what is meaningful to them, build positive career identities, and help them build and practice important employment-related skills. While they are helpful, traditional résumé critiques require significant investment of staff time and coordination of staff and student schedules. In an increasingly virtual service environment, students and practitioners are interested in digitally accessible services that might compliment staff resources.

This project explores the implications of offering artificial-intelligence (AI) résumé critiques to WIL students during the job search process. It seeks a greater understanding of factors related to students' uptake of AI-based résumé critiques and the influence of such uptake on subsequent job search outcomes. The project also seeks to understand differences between students' experiences of a traditional résumé critique and one featuring AI. Ultimately the goal of the project is to understand how career services centers might use AI to support WIL students.

The project features three studies designed to address five research questions. Study 1 explores career services staff members' perceptions of the consistency between AI-generated feedback and their own best practices in offering résumé critiques. Study 2 explores relationships between WIL students' demographic characteristics, use of an AI résumé critique, and job search dynamics such as number of job applications during a real job search process. Study 3 examines differences in students' résumé critique experiences between a traditional face-to-face critique and one preceded by an AI-based critique.

The results highlight the importance of traditional résumé critiques to WIL students during their job search process. Participation in such critiques was associated with increased knowledge and motivation to prepare a résumé, and students on average were willing to endorse a traditional résumé critique to their peers. WIL practitioners are encouraged to build partnerships with career services centers where such partnerships do not already exist. Trained staff within such centers can offer tremendous support to WIL students as they navigate through complex employment processes.

However, the results did not suggest an immediate and obvious benefit to introducing AI-based résumé critiques. Staff members' perceptions of the consistency between AI-based feedback and their own best practices was neutral. The subjective quality of a face-to-face résumé critique experience was not significantly improved by offering a 45-minute pre-encounter workshop featuring an AI résumé critique program. Self-reported learning outcomes associated with adding such AI critiques suggest that use of the AI focuses students' attention on the mechanics of writing and may distract from other goals of face-to-face critiques. Further, while many students who used the AI improved the quality of their résumés, such improvement was not meaningfully associated with job search outcomes such as greater likelihood of being interviewed by an employer.

The project reminds us of the important role career services centers can play in support of WIL students. Results suggest that résumé critiques are helpful for improving the quality of students' résumés and their confidence in preparing job applications. Students reported greater preparedness to write a résumé following such critiques. AI-based résumé critiques may be helpful for identifying issues in students' writing. Such issues can be distracting to employers and so are relevant to WIL students' success. In particular, the AI may be helpful to junior students with limited résumé writing experience, English-language learners, and/or students who are asked to provide standardized résumés, such as those in some business school programs.

# Introduction

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Understanding how best to serve work-integrated learning (WIL) students is important to the mutual success of such students and the programs in which they participate (Smith, 2016). This project focuses on ways in which WIL programs, in partnership with career services centers, can best support their students during the WIL job search. The WIL job search is the process through which WIL students identify, assess, and apply to job opportunities. It is common in many forms of WIL, including co-operative education (co-op). In such programs, students sift through job descriptions and employer information and then make decisions about where to send job applications. They seek jobs that match their interests and abilities and that offer meaningful opportunities to learn and grow (Drewery et al., 2021).

For many WIL students, the job search process is far from straightforward. It requires careful consideration of dozens or even hundreds of job postings. It then requires an assessment of the match between personal interests and the job, as well as an honest assessment of one's probable success in obtaining the job. More than that, WIL students often compete with each other for the most attractive jobs. This suggests great pressure on each student to communicate personal strengths in relation to employers' desires. It is not surprising that the job search process is often a stressful one that for many comes with an emotional cost (Drewery et al., 2019). While some stress can be beneficial, the challenge for WIL administrators is to support students as they navigate the job search process.

Many WIL programs partner with career services centers to support WIL students throughout their search for jobs. Career services centers aim to help students develop career plans, build positive career identities, and practice employment-related skills such as interviewing (Steven et al., 2019; Toporek & Cohen, 2017). As such, they are relevant to WIL students who might seek support. Through the delivery of workshops and

one-on-one sessions, career services centers might help WIL students transition successfully from their academic pursuits to meaningful work (Smith et al., 2009). Indeed, when WIL students participate in career-related services, they can develop skills and knowledge that are beneficial throughout the job search process (McIlveen et al., 2011; Reddan & Rauchle, 2012).

### *Résumé Critiques during the WIL Job Search Process*

The focus of this project is on one particular career service, résumé critiques, and the role that they might play in WIL students' job search experiences. Résumé critiques involve conversations about students' identities, experiences, values, and strengths, and how best to communicate these in job applications. Such critiques are among the most popular career services offered by post-secondary education institutions (Gallup, 2016; Makela et al., 2014). Typically, they are delivered in brief sessions that include a face-to-face interaction between a staff member and a student. When done right, such critiques can help students identify what is meaningful to them, build positive career identities, and help them build and practice important employment-related skills (Stevens et al., 2019; Toporek & Cohen, 2017).

Though on the surface they can appear like a simple editing service, résumé critiques can serve as a significant means of support. They can be approached with the intention to prompt self-reflection and to communicate to the client that they matter as an individual (Amundson et al., 1995). They can also enhance knowledge and skills associated with preparing high-quality résumés, such as transferable skills analysis (Crozier & Lalande, 1995; Lalande & DeBoer, 2012; McDow & Zabrocky, 2015). This is helpful because, without a personal connection or referral, employers need to depend heavily on evidence of such transferable skills. They likely "screen out" students with weaker résumés and invite students with stronger résumés to subsequent stages of recruitment (Cole et al., 2007; Watkins & Johnston, 2000).

Traditionally, résumé critiques have been offered to students in person, or less frequently by phone or video chat, often scheduled during common business hours. Typically, they are delivered in brief sessions in which students present a hard or soft copy of their résumés. Trained staff then help students reflect on past experiences to identify strengths. Such student-staff interactions are meant to help students identify who they are, what they do well, and how they might distinguish themselves from other job applicants. The popularity of such services suggests that they have helped a great many students.

However, this approach can face logistical limits. At many institutions, student demand for résumé critiques outpaces the availability of staff resources. For example, WIL job applications are often “due” to employers on specific dates. Inevitably, students will seek support around such due dates. When this happens, the number of students seeking support may exceed the number of staff available to provide it. Moreover, demand for virtual (i.e., online) meetings is growing in ways that suggest the need to rethink traditional résumé critiques. Many students now seek support from their own private spaces at times suitable to them but perhaps not manageable for staff (Dietsche & Lees, 2017). Certainly, the ongoing COVID-19 pandemic has amplified demand for virtual services. This suggests the value of examining alternative approaches to offering résumé critiques.

### *Artificial Intelligence Résumé Critiques*

Artificial intelligence (AI)-based résumé critiques have been offered as a solution to the issues outlined above. In recent years, AI has been applied to several career services. For example, it has been used to help students master written communication skills (Aluthman, 2016), teamwork skills (Beaubien & Baker, 2004), and emotional intelligence (Barney & Madigan, 2019). In the context of WIL, AI has also been used to help students identify internship positions that are most related to their interests (Nguyen et al., 2018). In recent years, several AI-based résumé critiques

have also emerged. Such AI programs are increasingly common in everyday use by students, employers, and educators alike. Indeed, hundreds of post-secondary institutions across the world now offer such critiques to interested students.

AI-based résumé critiques may be compelling in the context of WIL for two main reasons. First, they might complement staff resources insofar as they prepare students for “deeper” conversations with staff. The post-secondary service model proposed by at least some AI résumé critique software vendors is for students to use the AI software early in the résumé writing process. Students might be asked to reach a minimum standard of quality as assessed by the AI before interacting with a staff person. Students might incorporate AI-generated feedback into revised résumés. This could result in a shift in staff involvement from correcting errors to exploring deeper topics, such as students’ interests.

Second, AI-based résumé critiques offer the opportunity to access services that appear limitless. AI-based critiques are accessible from virtually any space and at any time, and they do not require the coordination of student and staff schedules. As such they might represent an appealing “just in time” solution to student demand. This is especially compelling given the ongoing global COVID-19 pandemic and a dramatic shift in recent years to remote learning and remote service delivery.

Despite these points, we know very little about the practical consequences of introducing AI-based résumé critiques to WIL students. In what ways do such critiques differ from traditional staff-delivered résumé critiques? What do they offer that staff may not offer? Moreover, how might AI-based critiques invite desirable outcomes within WIL, including greater success in the WIL job search? Addressing such questions would inform ways in which WIL programs and career services centers can work together to serve WIL students, especially in virtual/remote service settings. It is inevitable that AI will transform how institutions and students interact (Aoun, 2017; Cox, 2021). Now is the time to explore how AI-based career services might be helpful to WIL students.

# Purpose, Research Questions, and Overview of Studies

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Résumé critiques offered by career services centers play an important role in support of WIL students through the job search process. AI-based critiques may be compelling because they are accessible in an increasingly virtual world and may support staff who deliver such critiques. The purpose of this project is to further our understanding of the influence of AI-based résumé critiques on students' résumé critique experiences and selected outcomes of such critiques within the WIL job search process. At a broader level, the project seeks an understanding of how career services centers can best partner with WIL programs to support WIL students as they navigate employment dynamics.

Five research questions were developed to guide the project and were addressed in three studies. Research question 1 asks: to what extent do staff perceive AI-generated feedback about students' résumés is aligned with best practices in providing résumé critiques? This question was relevant to establishing the degree of consistency between what is typically offered to students and what an AI-generated résumé critique might offer to students. We addressed this question in study 1 by examining career services staff members' perceptions of the consistency between their own best practices and the feedback generated by the AI.

Research question 2 asks: how might students' demographic characteristics influence their decisions to use an AI-based résumé critique? This was useful for exploring relationships between students' demographic characteristics and experiences using the AI. It was addressed in study 2, a field study in which we tracked students' use of the AI and tracked other outcomes. Study 2 was designed to address two additional research questions. Research question 3 asks: to what extent do students who use the AI improve the quality of their résumés? If the AI offers helpful feedback, then greater use of the AI may be linked with improvement résumé quality. Thus, we explored whether students

who used the AI multiple times improved on the quality of their résumés. Also, research question 4 asks: how is use of the AI associated with job search behaviours and outcomes? We speculated that use of the AI could improve the quality of students' résumés and result in greater success during a real job search process.

Finally, research question 5 asks: how does adding an AI component to a typical résumé critique influence students' résumé critique experiences? As mentioned, AI résumé critique vendors propose that using the AI can improve the quality of subsequent student-staff interactions. We tested this proposition in study 3, a field experiment. Specifically, we examined differences in students' résumé critique experiences between those who participated in a typical résumé critique and one featuring an AI component.

All three studies focus on one specific AI-based résumé critique program. The name of the program, we feel, is not important to the insights offered here. Like several other AI-based résumé critique programs, this program compares students' résumés to a database of other résumés. After only a minute, it provides detailed feedback to students about ways in which their résumé can be improved. We selected this AI for the study because it is already used in several post-secondary education institutions across the world.

## Study 1

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### *Method*

Recall that study 1 was designed to address the following question: to what extent do staff perceive that AI-generated feedback about students' résumés is aligned with best practices in providing résumé critiques? By best practices, we mean the general approach that staff members themselves would take to offering feedback to students.

This includes the general tone of the feedback as well as the specific content of the feedback. We sought insights from trained staff members working at the Centre for Career Action (CCA) at the University of Waterloo to address this question.

Three CCA staff members were invited to review a set of five students' résumés. Such résumés were obtained with consent from a convenience sample of co-op students who were preparing for their first job search. Two of the students were in an arts/humanities program and three were in an engineering program. Students' résumés were uploaded to the AI and the feedback generated by the AI was collected. Such feedback was provided to the three staff members along with the résumés corresponding to the feedback.

We asked the staff to assess the consistency of the AI-generated feedback in relation to the feedback that they might have offered to the student based on the résumés they were presented. Staff reported their assessments by responding to a brief 11-item questionnaire that we devised for the purpose of this study. All 11 items are found in Appendix A. Five of those items concerned the "tone" of the feedback provided by the AI, four of the items concerned its content, and two items concerned overall evaluations. Responses to each item were provided on five-point scales where 1 = "strongly disagree" and 5 = "strongly agree". Staff also reported open-ended typed feedback independent of each other.

## *Results*

For each group of items (e.g., tone), we aggregated each reviewer's scores across the five résumés they reviewed. We were interested in understanding the extent to which the staff agreed with such items. The results are presented in Table 1. On average, agreement that the AI-generated feedback was consistent with staff members' own best practices was middling. Aggregating responses across the three staff members, level of agreement was between 2 and 4 on a five-point scale. This suggests that the staff members

were neutral about the extent to which they thought the tone, content, and overall accuracy of the AI was appropriate.

**Table 1.**

*Perceived consistency between AI-generated feedback and best practices reported by three staff members for select categories.*

Category	Staff A	Staff B	Staff C	Average
Consistency of Tone	3.93	3.80	3.98	3.90
Consistency of Content	3.68	2.80	2.84	3.11
Overall Consistency	4.20	2.80	2.40	3.13
Overall Accuracy of "Score"	3.50	2.40	2.50	2.80

This result was echoed in staff members’ open-ended responses. Some benefits and some issues with the AI were identified. One staff member wrote that “if the student clicks all the way to the targeted critique, this will be helpful!” Another commented that the AI “caught that [the student] did not include a phone number.” Other comments suggest that the AI “did a good job of highlighting why the student needs to add more content to the résumé.” A sentiment shared among the educators was that “a first year student, or one with little experience writing a résumé, will find some help” using the program.

However, open-ended responses also identified serious concerns. Comments suggested that “some of the language seems harsh.” Indeed, the program often presents feedback that something is “wrong” about the résumé. The educators were worried that

such feedback could discourage students. For instance, one comment read: “Hopefully getting such a low score in this case would get a student to come in to see a career advisor.” Another summarized by writing “that this tool might be used as a preliminary check prior to an appointment, but [should] never [be] used instead of an appointment with a [career educator].” This quote suggests that the AI might be useful as a preliminary assessment of students’ résumés sometime before students participate in a face-to-face encounter with staff.

## *Discussion*

Given the pressure on staff to deliver high-quality résumé critiques and the promise of AI-based career services, we expected that staff members would strongly endorse the AI-based résumé critiques. After all, such critiques presumably offer support to staff, and staff involved in this project were initially excited about the potential help that the AI could provide. However, we found instead an underwhelming response to the AI. Staff members acknowledged that students who were less familiar with writing résumés might benefit from such feedback. However, they also shared that the AI was lacking in several regards, including misalignment with general best practices in career education. The collective concern was that the content of feedback could deter students from seeking out further résumé critiques.

Ultimately, staff agreed that the AI-generated critiques might be of interest in some cases (e.g., first-year students) but that students would be better off attending an in-person critique. This is consistent with the perspective that in-person critiques offer opportunities for self-analysis. When trained staff meet with students, they offer more than commentary on students’ résumés. They also facilitate reflection in ways that help students identify strengths. Such reflection can enhance students’ feelings of support and confidence about their readiness to job search, but also simultaneously support preparation for successful networking (a well-established, strong job searching method)

and interviews. This in turn can have implications for the student's future use of valuable career services. These dynamics are tied to the human component of the face-to-face interaction between staff and students and are deeper than the feedback provided by the AI.

## Study 2

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### *Method*

Recall that study 2 was designed to address the following three research questions:

- Research question 2: how might students' demographic characteristics influence their decisions to use an AI-based résumé critique?
- Research question 3: to what extent do students who use the AI improve the quality of their résumés?
- Research question 4: how is use of the AI associated with job search behaviours and outcomes?

We designed a field study to address these questions. Data were collected with consent (project #42005) from co-op students at the University of Waterloo ( $n = 105$ ) who were enrolled in engineering ( $n = 54$ ), math ( $n = 22$ ), or accounting ( $n = 29$ ) and took part in a competitive job search from May to September 2020. In this context, employers' job advertisements are provided to students in early May. Students review advertisements and apply to as many as they like. Employers then review students' job applications, interview select students, and make hiring decisions. We were interested in how students' use of an AI résumé critique during this process impacts students' success by the end of the term.

It may be relevant to note that this study was conducted during the global COVID-19 pandemic. During this time, the labour market for students was challenging. Fewer jobs were advertised and fewer students than expected in a typical term were hired. As well, students could not access in-person face-to-face résumé critiques throughout the term. Only online person-led services were available. We were eager to understand the implications of using an AI résumé critique under these conditions.

All participants were provided access to the AI near the beginning of the term. They were allowed to use the program for as long as they liked and could upload up to 10 résumés at any point. The program tracked who used the program, for how long they used it, how many résumés they uploaded, and the scores associated with each upload<sup>1</sup>. Only those who consented to share this information are included in analyses. At the end of the term, we collected various employment-related data, as described below. Thus, we had access to three data sources: participants' use of the AI, their employment outcomes, and their demographic characteristics. We examined descriptive statistics and associations among variables from these sources.

The following variables were collected for the study:

1. Minutes spent using in the AI (“minutes”)
2. Number of résumés uploaded to the AI (“uploads”)
3. Score of first résumé uploaded (“first score”)
4. Score of most recent résumé uploaded (“last score”)
5. Number of job applications submitted during the term (“applications”)
6. Number of job interviews during the term (“interviews”)

<sup>1</sup> In addition to detailed feedback to users, the AI assigns a score to each résumé. The score is based on performance in three categories representing presentation (e.g., how the résumé is formatted), language (e.g., use of effective action verbs), and skills (e.g., whether the skills advertised are considered desirable). The highest possible score is 100.

7. Employment status at the end of the term, coded as 0 = no, 1 = yes (“employed”)
8. Number of previous work terms (“work terms”)
9. Gender, coded as 0 = male, 1 = female (“gender”)
10. Citizenship, coded as 0 = not Canadian, 1 = Canadian (“Canadian”)
11. Childhood household income in CAD, coded in 11 categories where 1 = \$0 to \$19,999 and 10 = \$250,000 or more (“income”)

## *Results*

### ***Demographic Variables and AI Use***

Participants on average had 1.13 previous work terms ( $SD = .73$ , median = 1). The majority of participants were male ( $n = 70$ , 67%) and Canadian citizens ( $n = 88$ , 84%). The median income category corresponds to \$75,000 to \$99,999. Thirty-nine of the 105 participants (37%) logged in to the AI platform. AI users spent an average of 47.5 minutes ( $SD = 67.4$ , range = 1 to 347, median = 18) and uploaded an average of 2.46 résumés ( $SD = 2.19$ , range = 0 to 10, median = 1). Participants also reported on their ethnicity, but this variable was not used in analyses because the number of students in most categories was too low for meaningful quantitative analysis. Almost 40 percent ( $n = 39$ , 38%) were Southeast Asian, one third ( $n = 34$ , 33%) of the participants were Chinese, and one fifth ( $n = 19$ , 18%) were White.

Correlational analyses were used to examine the relationships between demographic variables and AI use variables. Results are presented in Table 2. Each row represents the correlations between one demographic variable and all AI use variables. The number of previous work terms, which was considered a demographic variable, was negatively associated with the number of résumés uploaded to the AI ( $n = 39$ ,  $r = -.40$ ,  $p = .01$ ). This suggests that students with more previous work experience uploaded fewer résumés and students with less previous work experience uploaded more résumés.

Among those who logged in to the AI, gender, citizenship, and childhood household income were unrelated to all AI use variables (all  $p > .21$ ).

**Table 2.**

*Selected results of correlational analyses between demographic variables and AI use variables.*

	<b>Correlations with AI Use Variables</b>						
	<i>M</i>	<i>SD</i>	<b>Minutes</b>	<b>Uploads</b>	<b>First Score</b>	<b>Last Score</b>	<b>Increase</b>
<b>Work Terms</b>	1.13	0.73	-.22	-.40*	.12	.09	.09
<b>Gender</b>	0.33	0.47	-.07	.06	.04	.14	-.06
<b>Citizenship</b>	0.84	0.37	.02	.07	.12	.24	.03
<b>Income</b>	5.15	2.32	.05	.01	.17	-.02	-.19

Note: \*  $p < .05$

### ***Improvements in Résumé Quality***

The average AI score for the first résumé uploaded was 66.00 ( $SD = 8.54$ ). Of the 39 participants who uploaded at least one résumé, 19 uploaded multiple résumés. Of those 19, AI résumé scores improved from the first upload ( $M = 64.47$ ,  $SD = 7.94$ ) to the latest upload ( $M = 78.37$ ,  $SD = 9.56$ ). Results of a paired samples t-test suggest that such improvement is statistically significant,  $t(18) = 6.04$ ,  $p < .001$ . Also, a correlational analysis suggests that the greater the number of résumés uploaded to the AI, the greater the increase in AI score from first to latest upload ( $n = 19$ ,  $r = .63$ ,  $p = .004$ ).

### ***AI User and Job Search Behaviours/Success***

On average, participants applied to 94 jobs ( $SD = 85.09$ , range = 0 to 472, median = 74.50) and received two interviews ( $M = 1.92$ ,  $SD = 2.39$ , range = 0 to 13, median = 1). Forty-six of the 105 participants (44%) were employed by the end of the recruitment process during the term in which the study was conducted. Of the 105 participants in the study, 69 (66%) received at least one interview. Twenty of those participants had their first interview prior to exposure to the AI and so are excluded from some of the analyses to follow. The average number of days from exposure to the AI to first interview was 29 ( $n = 49$ ,  $SD = 15.72$ ). Of the 105 participants, 59 (56%) were eventually employed. The more applications participants made, the more likely they were employed at the end of the term ( $n = 105$ ,  $r = .26$ ,  $p = .008$ ). Similarly, the more interviews participants had, the more likely they were employed at the end of the term ( $n = 105$ ,  $r = .43$ ,  $p < .001$ ).

Correlational analyses were used to examine the relationships between AI use variables and job search variables. Results are presented in Table 3. Among those who used the AI, minutes spent was unrelated to number of applications, number of interviews, and employment at the end of the term (all  $p > .67$ ). The number of résumés uploaded was negatively associated with employment at the end of the term ( $n = 39$ ,  $r = -.33$ ,  $p = .04$ ). Students who uploaded more résumés were less likely to be employed at the end of the term. First score was negatively related to number of applications ( $n = 38$ ,  $r = -.44$ ,  $p = .006$ ). Those with higher scoring résumés applied to fewer jobs throughout the term. Neither latest score nor increase in score were related to applications, interviews, or employment (all  $p > .18$ ).

**Table 3.**

*Selected results of correlational analyses between AI use variables and job search variables.*

			<b>Correlations with Job Search Variables</b>		
	<i>M</i>	<i>SD</i>	<b>Applications</b>	<b>Interviews</b>	<b>Employed</b>
<b>Minutes</b>	47.49	67.44	.07	-.07	-.05
<b>Uploads</b>	2.46	2.19	-.14	-.23	-.33*
<b>First Score</b>	66.00	8.54	-.44**	-.21	.18
<b>Last Score</b>	78.37	9.56	-.25	-.32	.01
<b>Increase</b>	13.89	10.03	-.05	-.19	-.14

Note: \*  $p < .05$ , \*\*  $p < .01$

## *Discussion*

Very few students—only 18% of the students in this study—used the AI. Students’ demographic variables were largely unrelated to such uptake. Gender, citizenship, and childhood household income were not related to any of the AI use variables. Number of work terms completed was negatively associated with number of résumés uploaded. In other words, the more work experience students had, the fewer résumés they uploaded to the AI. This is likely to do with greater employment outcomes for senior students. Those with less work experience may have been interested in the AI to “gain a leg up” on the competition.

Also, few students chose to upload more than one résumé to the AI. Those who

did improved on the quality of their résumé, according to the AI, with more use of the AI. This suggests that the AI could offer a useful opportunity to improve the quality of students' résumés. However, it is not clear whether students internalized the information that the AI provided. It is possible that they simply “gamed” the system, making minor adjustments to explore how many more “points” they could get from the AI. Yet, this seems an unlikely explanation for students' behaviour given that they are actively trying to secure employment. It seems more likely that they searched the AI for feedback that they could implement with the hope of improving employment success.

Use of the AI was not related to co-op students' success in a job search. In fact, there was a negative correlation between number of uploads and employment and between first score and number of applications. Such correlations are intuitive. The longer into the process students ventured without success, the more job applications they submitted. Among those who were unsuccessful, it makes sense that they might use the software more to improve their resume. In this sense, the uptake of the AI may have been most informative in identifying which students were at risk of an unsuccessful job search process.

## Study 3

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### ***Participants***

Recall that study 3 was designed to address research question 5: how does adding an AI component to a typical résumé critique influence students' résumé critique experiences. Participants in the study were undergraduate co-operative education (co-op) Engineering students at the University of Waterloo who were preparing for their first job search ( $n = 60$ ). Co-op is a program of education in which students seek employment as an educational requirement. Co-op students alternate between academic terms and terms of paid employment throughout their education. Such students were of

interest because they represent typical users of career services who might be interested in AI-based résumé critiques during a job search. The students included in this study were mostly Asian (67%) or white (18%); almost half (47%) were female.

### ***Procedure and Conditions***

After ethics clearance (project #41680), potential participants were invited by email to the study which took place in January 2020. The study occurred on campus in a building associated with co-op students and employment. As they arrived, students were provided study documentation and were randomly assigned to either a “traditional” or “AI-first” condition.

Students in the traditional condition participated in a traditional face-to-face résumé critique. Each critique lasted about 15 minutes long and was conducted by a trained career educator matched to students at random. All critiques were conducted in accordance with best practices in career educating/advising. After their critique, students in the traditional condition were asked to complete a questionnaire about their experience (called the “post-critique survey”). Staff also completed a questionnaire on which they reported their perception of each student’s area(s) of focus and learning. Once questionnaires were collected, students were thanked for their time and entered into a draw for one of three \$50.00 gift cards. They could choose to remain at the study venue to use the AI-based résumé critique and provide feedback about it, but some left at this point in time.

The procedure was identical for students in the AI-first condition, with two exceptions. First, prior to participating in a traditional face-to-face résumé critique, students in this condition were invited to use an AI-based résumé critique. They were provided a brief introduction to the AI and given instructions by a knowledgeable career educator on how to use it . Then, they were provided 45 minutes to upload their résumé to the AI and review the feedback that it generated. The AI generates feedback within 30 seconds of uploading a résumé, so students had ample time for review.

Second, after using the AI, students in the AI-first condition were asked to complete a brief questionnaire about their experience. As mentioned, students in the traditional condition were provided the same opportunity, after their face-to-face critique, but some passed on the opportunity. For students in the AI-first condition, the students proceeded to the face-to-face critiques and questionnaires as described above.

This between-subjects study design allowed us to examine students' experiences of an AI-based résumé critique. Perhaps more importantly, it allowed us to examine differences between students' experiences of a traditional face-to-face résumé critique and one preceded by an AI-based résumé critique. We were most interested in the consequences of adding an AI-component before students met with staff. The vendor of this particular AI recommended that it be used by students prior to an interaction with staff. Specifically, we explored two questions. First: how would such an addition influence student-staff interactions? Second: might it improve the quality of students' résumé critique experiences overall?

## ***Measures***

***Topics and Depth of Discussion.*** At the end of each résumé critique, career educators reported which of up to five topics were discussed: (1) grammar and spelling, (2) résumé format, (3) bullet content (e.g., information-rich action verbs), (4) skill identification, and (5) résumé customization (i.e., how to match the résumé to a specific job or industry). These topics were identified before the study by staff as the most common within critiques. Responses were coded as 0 = “not discussed” and 1 = “discussed”. Responses were then transformed into two variables. The first three topics were merged into a “résumé mechanics” variable and the final two topics were merged into a “skill advertisement” variable. Again, these categories were constructed based on conversations with career educators about their typical interactions with students.

Staff were also asked to report on the general “depth” of the conversation where 1 = “mostly surface” and 7 = “mostly deep”. This variable was included to better understand the influence of the AI-based résumé critique on student-staff interactions.

***Self-Reported Learning Outcomes.*** Students in the AI-first condition were asked to report as many as three learning outcomes associated with the AI-based résumé critique. Examples of learning outcomes reported include “Don’t overuse the same action verb,” and “To change the font of my résumé, so it can be more readable.” Such learning outcomes were coded by the first author into categories that best summarized the data. The goal was to explore the insights students gleaned from using the AI. Critically, we did not make efforts to include learning outcomes associated with the AI-based résumé critique reported by those in the traditional condition, as students in that condition had the option to not interact with the AI at all and thus some left the study after their face-to-face critique. As well, those in the traditional condition who elected to use the AI afterwards did so for less time (between 20 and 30 minutes) than did those in the AI first condition (45 minutes). Thus, a fair comparison between conditions is not possible.

Additionally, all students were asked to report three learning outcomes associated with their experience of the résumé critique event as a whole. Such learning outcomes were used to identify insights students gleaned from face-to-face résumé critiques versus those gained through using the AI software prior to accessing a face-to-face critique. Such learning outcomes were coded by the first author and a research assistant. Each response was coded based on the topics of discussion variables described earlier. Examples of statements coded as résumé mechanics are “I learned that I may use too many filler words,” and “I need to incorporate more action words into my bullet points.” Examples of statements coded as skill advertisement are “More emphasis on soft skills,” and “Balance in résumé between hard/soft skills is important.” The intraclass correlation coefficient (ICC) was used to examine agreement between the coders. Initial agreement between the two coders was sufficient for both variables (résumé mechanics: ICC = .99; skill advertisement: ICC = .96). A second research assistant was consulted to resolve disagreements.

**Knowledge and Motivation.** On the post-critique survey, students were asked to self-report the degree to which they felt knowledgeable about preparing a résumé (1 = “not knowledgeable” to 6 = “very knowledgeable”) and motivated to prepare a résumé (1 = “not motivated” to 6 = “very motivated”). They responded in terms of how they felt before their face-to-face critique and after it. Staff members also completed the same measures in terms of their perceptions of student knowledge and motivation both before and after the face-to-face critique (where 1 = “not knowledgeable” to 6 = “very knowledgeable” for knowledge, and 1 = “not motivated” to 6 = “very motivated” for motivation).

**Willingness to Recommend the Critiques.** Students in the AI first condition were asked to report their willingness to recommend the AI-based résumé critique to their friends. On the post-critique survey, students in both conditions were asked to report their willingness to recommend the face-to-face critique to their friends. Responses to both questions were provided on 10-point scales where 1 = “not at all likely” and 10 = “extremely likely.” These questions were included in the study because willingness to recommend is a key indicator of experience quality (Ziethaml et al., 1996).

## *Results*

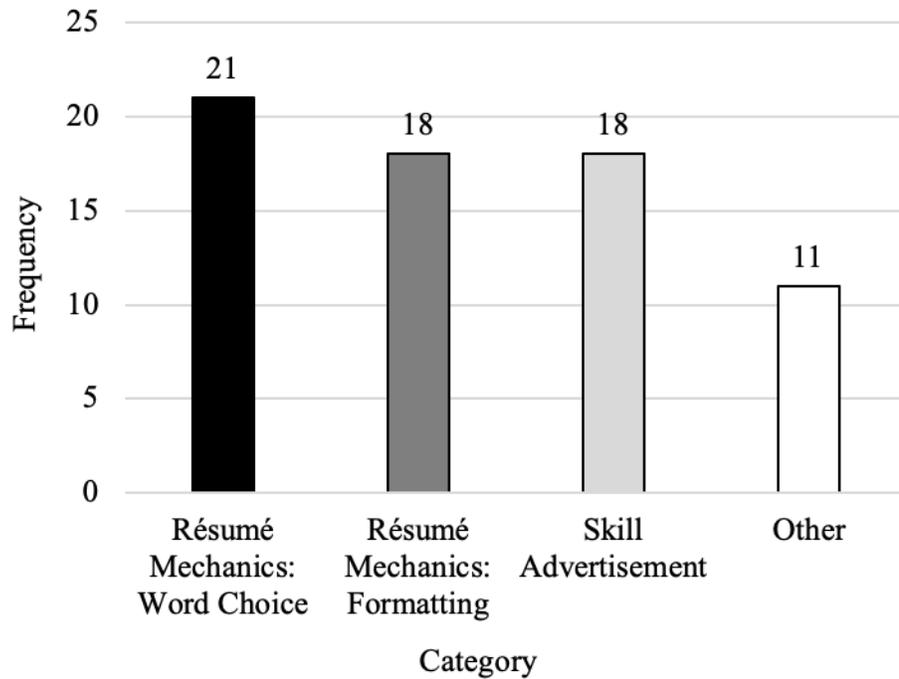
### ***Topics and Depth of Discussion***

We first examined differences in topics and depth of discussion between the two conditions. Results of two-tailed t-tests suggest that résumé mechanics were discussed marginally more in the AI first condition ( $M = .64, SD = .21$ ) than in the traditional condition ( $M = .56, SD = .18$ ), but the difference was not significant,  $t(58) = 1.72, p = .09$ . Discussions of skill advertisement did not differ between conditions,  $p = .75$ . The depth of conversation (pooled  $M = 4.64, SD = 1.46$ ) also did not differ between conditions,  $p > .65$ .

## ***Self-Reported Learning Outcomes***

We then examined self-reported learning outcomes of the AI-based critique for students in the AI first condition. The results of the coding analysis are shown in Figure 1. Twenty-eight students provided at least one learning outcome after using the AI. A total of 68 responses were provided. Of those, 39 (57.4%) were related to résumé mechanics. Two subcategories were clear. First, the category of responses mentioned most frequently was labelled word choice (21 responses). Included in this category were reports of learning about filler words and overused words (e.g., “Too many filler words,” “Don’t use the same word over and over,” “Word overused”). Second, the formatting category (18 responses) contained reports of learning about how to better format one’s résumé (e.g., “A lot of information about consistency and formatting that I couldn’t have caught,” “I need 2-3 lines for each bullet,” “Page layout and spacing. There were some inconsistencies in my spacing”).

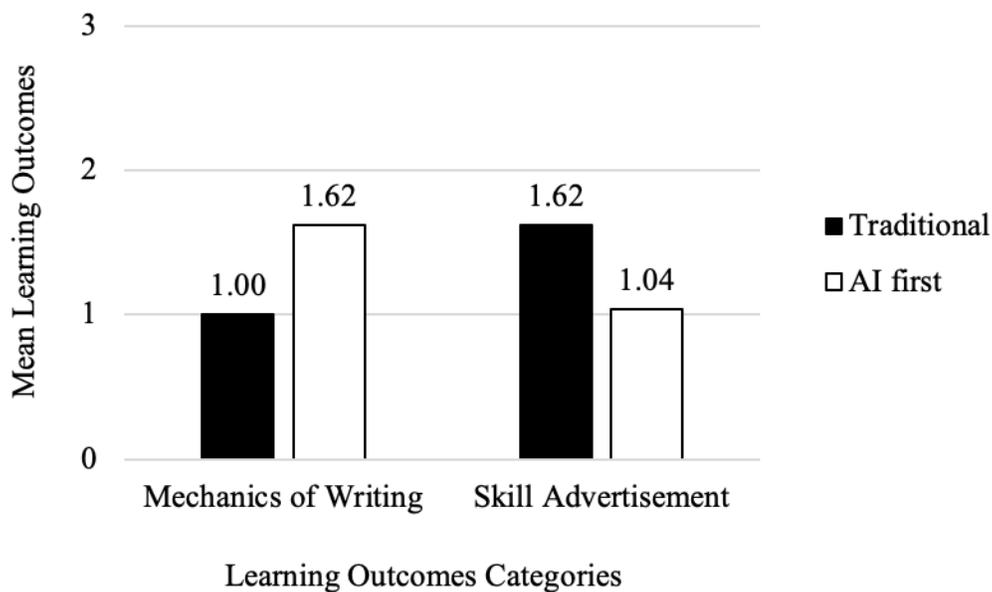
The skill advertisement category (18 responses) contained reports of learning about how to best communicate one’s skills to employers (e.g., “I could have used action verbs that were stronger than ‘use’ or ‘provided’,” “Feedback about common skills that I have shown evidence of and some I haven’t/could do more of,” “I learned the good points about my résumé (listing teamwork)”). Several (11) responses were categorized as other. These responses included lessons about the AI in general (e.g., “AI has serious potential,” “[The AI] was not able to identify software names like Solidworks and AutoCAD”), emotional reactions to the critique (e.g., “Increased confidence due to detailed feedback”), and several responses that were unclear.



**Figure 1.**

*Frequencies of learning outcome categories based on reported learning outcomes by students in the AI first condition (n = 28).*

We also examined differences between conditions in self-reported learning outcomes of the face-to-face résumé critique. We were interested to understand whether learning outcomes from the face-to-face résumé critique would differ between those who first used the AI and those who did not. Pooling responses between the two conditions, students reported 132 learning outcomes. The average number of learning outcomes reported did not differ between the traditional condition ( $M = 2.66, SD = .61$ ) and AI first condition ( $M = 2.81, SD = .40$ ),  $t(53) = 1.08, p = .29$ , but there was a significant difference in the categorization of learning outcomes. Students in the traditional condition reported fewer learning outcomes related to the mechanics of writing ( $M = 1.00, SD = .93$ ) than did those in the AI first condition ( $M = 1.62, SD = 1.17$ ),  $t(53) = 2.15, p = .04$ . Students in the traditional condition also reported more learning outcomes associated with skill advertisement ( $M = 1.62, SD = .94$ ) than did those in the AI first condition ( $M = 1.04, SD = .96$ ),  $t(53) = 2.27, p = .03$ . These differences are illustrated below in Figure 2.



**Figure 2.**

*Mean number of learning outcomes reported by students in the traditional condition and AI first condition (n = 60).*

### ***Self-Reported Knowledge and Motivation***

Table 4 presents means and standard deviations for self-reported knowledge and motivation. Results of two-tailed t-tests suggest that neither pre-critique knowledge nor pre-critique motivation differed significantly between conditions, both  $p > .33$ . Similarly, self-reported post-critique motivation did not differ significantly between conditions,  $p > .51$ . Post-critique knowledge was marginally higher for those in the AI first condition ( $M = 5.32$ ,  $SD = .57$ ) than in the traditional condition ( $M = 5.03$ ,  $SD = .67$ ), but the difference was not significant,  $t(58) = 1.75$ ,  $p = .09$ . Results of paired samples t-tests also suggest that post-critique knowledge and post-critique motivation were significantly higher than pre-critique knowledge and pre-critique motivation, respectively,  $p < .001$ . Splitting the sample by condition revealed the same result, suggesting that students in both conditions reported similar pre- to post-critique increases in knowledge and motivation.

**Table 4.**

*Means and standard deviations of students' self-reported pre- and post-critique knowledge and motivation (n = 60).*

	Knowledge				Motivation			
	Pre-critique		Post-critique		Pre-critique		Post-critique	
Group	M	SD	M	SD	M	SD	M	SD
Traditional	3.97	.89	5.03	0.67	4.57	1.30	5.47	0.57
AI First	4.04	1.00	5.32	0.57	4.24	1.28	5.51	0.53

### ***Staff-Perceived Knowledge and Motivation***

Table 5 presents means and standard deviations for staff-perceived knowledge and motivation. Results of two-tailed independent samples and paired samples t-tests were similar to those reported above. Neither staff members' perceptions of students' pre-critique knowledge nor pre-critique motivation differed between conditions, both  $p > .50$ . Staff perceptions of post-critique knowledge and motivation did not differ significantly based on condition, both  $p > .46$ . Post-critique knowledge and post-critique motivation were greater than pre-critique knowledge and pre-critique motivation, respectively, in both conditions, all  $p < .001$ . This suggests that staff perceived that students were better prepared to write a résumé as a result of the face-to-face critique regardless of whether students used the AI.

**Table 5.**

*Means and standard deviations of students' pre- and post-critique knowledge and motivation as perceived by staff (n = 60).*

	Knowledge				Motivation			
	Pre-critique		Post-critique		Pre-critique		Post-critique	
Group	M	SD	M	SD	M	SD	M	SD
Traditional	3.70	1.12	5.40	0.67	4.97	1.22	5.57	0.73
AI First	3.90	1.11	5.33	0.69	5.00	1.00	5.69	0.54

### ***Willingness to Recommend***

Recall that students in both conditions were asked to report on their willingness to recommend the face-to-face critique. Students who used the AI-based critique, either before or after the face-to-face critique, were also asked to report their willingness to recommend the AI-based critique to others. Results of two-tailed independent samples t-tests suggest that there were no significant differences between conditions in terms of willingness to recommend either form of the résumé critique. Willingness to recommend the AI did not differ significantly between the traditional condition ( $M = 8.39, SD = 1.20$ ) and the AI first condition ( $M = 8.09, SD = 1.31$ ),  $t(52) = .86, p = .39$ . Likewise, willingness to recommend the face-to-face critique did not differ significantly between the traditional condition ( $M = 9.07, SD = 1.05$ ) and the AI first condition ( $M = 9.22, SD = 1.01$ ),  $t(55) = .57, p = .57$ . Notably, willingness to recommend the face-to-face critique was somewhat higher than willingness to recommend the AI-based critique.

We also transformed participants’ responses into Net Promoter Scores (NPS; Reichheld, 2003) to gain a greater understanding of willingness to recommend. NPSs are measures of the number of “promoters” (those who responded with a 9 or 10 on our scale) relative to the number of “detractors” (those who responded with a 6 or below on our scale) (Reichheld, 2003). It is used widely to understand client experiences and is proposed as a predictor of program loyalty (Reichheld, 2006).

We calculated NPSs for both the face-to-face critique and the AI critique for participants in each condition. Results are presented in Table 6. Scores range from –100 to +100<sup>2</sup>, where higher scores suggest a stronger endorsement of the target (Reichheld, 2003). NPSs for the face-to-face critique were similar for participants in the standard condition (+76.7) and AI first condition (+77.8). This again suggests that adding the AI did not enhance the quality of the face-to-face critique. NPSs for the AI were lower than the NPSs for the face-to-face critique. In the standard conditions (i.e., students who did a face-to-face critique and then used the AI), the NPS was +42.3. In the AI first condition, the NPS was even lower at +28.6. This suggests that participants strongly preferred the face-to-face critique to the AI critique.

**Table 6.**

*Net Promoter Scores (NPSs) related to in-person critiques and the AI program for participants in the control and experimental groups.*

Conditions	Traditional Critique			AI-based Critique		
	Promoters	Detractors	NPS	Promoters	Detractors	NPS
<b>Traditional</b>	80.0	3.3	+76.7	46.2	3.8	+42.3
<b>AI First</b>	77.8	0.0	+77.8	39.3	10.7	+28.6

<sup>2</sup> The NPS calculation involves subtracting the percentage of service “detractors” from the number of service “promoters” (see Reichheld, 2003). A NPS greater than 0 is desirable, a score of +30 is considered strong, and a score of +50 is considered excellent.

## *Discussion*

The results of this study suggest that offering an AI-based résumé critique component may influence students' résumé critique experiences in several ways. Compared to those who participated in a traditional résumé critique, those who first used the AI-based résumé critique discussed the mechanics of writing somewhat more. This may suggest that using the AI primes students' attention toward the mechanics of writing (see Bargh & Chartrand, 2014 for a discussion on priming). This makes sense given the plethora of feedback about writing that AI-based résumé critique programs can provide. The AI included in this study provides feedback about word choice, including which action verbs students' peers used to describe similar skills and accomplishments. Such information may have remained salient for students and so appeared more in conversation with staff members in a subsequent interaction.

Learning outcomes related to use of the AI strongly suggest that the AI renders issues with the mechanics of writing more salient. More than half of the “take away messages” from the AI related to bad spelling, overused and filler words, and poor formatting (e.g., bullets that were not aligned consistently). While the AI did convey information about how to write a more impactful résumé—such as by selecting more impactful verbs and quantifying accomplishments—such information is still tangentially related to the mechanics of writing. Thus, it seems clear that the AI-based résumé critique is useful as a tool for identifying errors within the structure or formatting of a résumé.

Further, the learning outcomes associated with the face-to-face résumé critique differed between those who first used the AI-based résumé critique and those who did not. Consistent with results related to topics of discussion, those who used the AI-based résumé critique first reported learning more about the mechanics of writing. Again, this suggests that use of the AI prior to a face-to-face critique primed students' attention toward the mechanics of writing. The AI highlighted mechanical issues such as poor

grammar, and this made such issues more salient to students, who then discussed mechanics of writing more and reported learning more about mechanics of writing than those who did not use the AI prior to a face-to-face critique.

Critically, our observations of these data and of the AI program in general suggest that there is information important to student success that is not offered by the AI. While the AI does a remarkable job of providing targeted feedback about students' writing, it seems to miss the mark on offering more delicate information. Consider that in face-to-face critiques, staff engage in active listening. Through such listening, they can "read between the lines" and make judgments about what feedback would be helpful to students. For example, staff are often able to identify cases where students are underselling their skills and can provide nuanced support to address this in a way that supports student agency and confidence.

By comparison, the AI is indiscriminate about its feedback. It compares students' résumés to a singular "gold standard" and provides feedback so that students might align their writing with that standard. As mentioned, this can be helpful to addressing blatant errors in students' résumés. Yet, it fails to offer the human-centered feedback that students often need. Sometimes, students benefit a great deal from being seen, acknowledge and seeing evidence that they matter. In other cases, there is something nuanced that could, if shared by staff, transform how students go about thinking about themselves and the value they can bring to a workplace or project. Such messages are not offered by the AI.

Data provided by students and staff suggest that participation in a traditional face-to-face résumé critique is associated with an increase in students' knowledge and motivation for preparing a high-quality résumé. Students and staff reported such increases regardless of students' exposure to the AI prior to their face-to-face interaction with staff. Use of the AI was also associated with a small increase in post-critique knowledge. However, this increase was not statistically different from the increase afforded by the traditional critique. This result suggests the importance of traditional

résumé critiques to preparing students for writing résumés. It may further suggest that the practical benefit of the AI for students' self-reported knowledge, while positive, is somewhat limited.

The willingness to recommend data suggest that on average students were willing to recommend the AI-based résumé critique to their peers. Such willingness may indicate that students were satisfied with the service offered by the AI (Zeithaml et al., 1996). However, it is interesting to note that students' willingness to recommend the traditional face-to-face résumé critique was higher than their willingness to recommend the AI-based résumé critique. This may suggest that adding an AI component does not enhance the subjective quality of a face-to-face résumé critique facilitated by a trained staff member.

## General Discussion

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### *Alignment of AI Feedback and Staff Feedback*

Research question 1 asked: to what extent do staff perceive AI-generated feedback about students' résumés is aligned with best practices in providing résumé critiques? We expected that staff would endorse the AI. Of course, they are under pressure to identify solutions to increased student demand for résumé critiques. Informal conversations with staff prior to the study suggested great curiosity and interest in benefits espoused by AI résumé critique programs. Conversely, staff support for the AI was limited. They were not especially confident that the content of the AI feedback and the tone of such feedback was aligned with their own best practices.

To be fair, staff did suggest some situations in which the AI would be useful. They offered that students with limited experience and/or poor writing skills could learn

about the mechanics of writing a strong résumé. This is intuitive. The greatest strength of the AI seems to be identifying deviations of well-structured sentences and well-formatted sections of a résumé. When students struggle to write clearly and/or organize their résumé in a coherent way, feedback from the AI could be helpful. It should be noted, however, that such use may not justify the AI. Several other tools offer spelling/grammar support and résumé templates, and some of these are free to use.

### *Demographic Characteristics and AI Use*

Research question 2 asked: how might students' demographic characteristics influence their decisions to use an AI-based résumé critique? We expected that some student groups would be hesitant to use the AI and that others would embrace it. We found instead a general disinterest in the AI. Only a small minority of students took advantage of the AI during the four months in which they sought out a co-op job. This is concerning because initial investments in AI-based career services can be expensive. It is surprising that so few students chose to explore the AI.

Contrary to expectations, there was little association between students' demographic characteristics and use of the AI. In a sense, this is encouraging. It suggests that deeper involvement in the AI are likely not preceded by dynamics surrounding gender, ethnicity, and social class. Instead, should the goal be to promote AI-based career services, practitioners might focus on broader attitudinal constraints to participation. Again, such constraints do not seem to be tied to students' demographic profiles.

### *AI Use and Readiness to Prepare Résumés*

Research question 3 asked: to what extent do students who use the AI improve the quality of their résumés? There was some evidence that use of the AI was associated with a greater readiness to prepare a résumé. In study 2, students who used the AI multiple times

improved the quality of their résumés from first to last upload. At least against the criteria thought important by the AI, this suggests that AI-based résumé critiques might help to improve the quality of students' résumés. Similarly, in study 3, students reported several positive learning outcomes after using the AI. They reported learning about the mechanics of writing most of all. Again, poorly written résumés may distract employers from identifying and appreciating that which students aim to highlight.

Further, students who used the AI prior to a face-to-face encounter reported marginally (though not statistically significantly) more knowledge and motivation to prepare a résumé. Such factors may be relevant to student success because subjective knowledge and motivation often underlie performance (e.g., Bailey & Phillips, 2016). However, the benefit of the AI to such outcomes above and beyond a traditional face-to-face résumé critique is, according to study 3, questionable.

### *AI Use and Job Search Outcomes*

Research question 4 asked: how is use of the AI associated with job search behaviours and outcomes? We found little evidence that choosing to use the AI résumé critique program was associated meaningfully with co-op students' success in a competitive job search process. Evidence was weak that using the AI more was associated with how students went about applying to jobs (i.e., number of applications submitted) and their success in the job search (i.e., number of interviews and becoming employed). Of course, simply uploading a résumé was not expected to result in drastically better employment outcomes. Rather, we speculated that using the AI could improve students' résumés and in turn slightly improve their attractiveness to employers. As far as the information we collected in study 2, we found no support for this proposition.

## *AI Use and Subsequent Résumé Critique Experiences*

Research question 5 asked: how does adding an AI component to a typical résumé critique influence students' résumé critique experiences? Students reported learning a great deal from face-to-face résumé critiques and strongly endorsed such critiques. They did not dislike their AI-based résumé critiques. However, the addition of such critiques to an already established face-to-face résumé critique service did not meaningfully enhance the quality of students' résumé critique experiences. This insight may inform several suggestions for the practice of those career educators who support WIL students. Such suggestions are offered below.

### *Suggestions for Practice*

Whether an AI-based résumé critique program is appropriate depends first and foremost on students' needs. Managers should ask: what do WIL students need as they prepare their résumés? In addressing this question, it seems important to consider the extent to which such students are asked to conform to a particular résumé template. In some situations, students are free to prepare their résumés how they see best (Arnuff et al., 2010). In other situations, students are asked to conform tightly to a prescribed template. Consider that at our University, co-op students are provided guidance about what a "good" résumé might look like, but they are free to create a customized résumé for each job as they see fit.

Elsewhere, students may be asked to follow a specific set of rules. Anecdotally, we note that WIL students at some business schools are provided a template and asked to populate it with their own information. The AI may be more appropriate for such WIL students than for those offered opportunities to construct unique résumés because the AI encourages students to move toward a unified "best practice". It provides clear rules about how a résumé ought to be formatted. Such rules may be quite helpful to some students and less helpful to others, in part based on whether their WIL program and target employers are sometimes seen to require a standardized résumé.

It is also important for managers to consider the alignment between their résumé critique philosophy and the feedback that the AI provides to students. Recall that the AI included in this study provides a “score” for students’ résumés. Other AI-based résumé critiques provide similar feedback. Some students might find such feedback helpful. Others, however, might react negatively to it. The résumé is an extension of students’ selves. Negative feedback about their résumé may be interpreted as negative feedback about them. If the philosophy of the résumé critique service is to provide information to students, then quantitative feedback may be helpful. If the philosophy leans more toward personal support for students of all circumstances, then the AI may actually provide harmful feedback to some students.

Managers might also benefit from a review of their broader service model to identify how résumé critiques are connected to related services. At our institution, résumé critiques are important opportunities to connect WIL students to various services. While they might meet with a staff member about their résumés, a 15-minute encounter with a caring employee helps to build rapport between the student and the career services center. Staff also convey information to students within the context of a résumé critique that is not directly related to such critiques, such as preparing them for networking, interviews, anticipating and coping with potential disappointment.

Students who feel supported and who are informed might then be more willing to participate in other services that are helpful to their career success. If the purpose of the critique is strictly to deliver information about students’ résumés, then the AI might offer useful information. Alternatively, if the purpose of the résumé critique is to invite early student engagement and initiate a building of trust, connection, and empowerment, then career services managers should think about investing more in staff resources than AI which cannot provide a “human touch”.

Among those managers who choose to adopt AI-based résumé critiques, several additional questions should be addressed. One of the most pressing relates to client education. Our study suggests that students who used the AI prior to an encounter with

staff were primed to think about mechanical issues. This seems a hindrance to the conversations staff and students could have about students' aspirations, supporting growth in their self-understanding, and the "bigger picture" of their unfolding careers. Managers will need to consider what service pathways or structures might enable productive use of such an AI-driven tool, so that it does not interfere with the higher-order value and outcomes of student-staff interactions.

Additionally, among those who adopt the AI, staff training will be crucial. The AI-driven critique offers an impressive array of information in an alluringly short timeframe. It may not be entirely obvious to end users how such information is structured within the feedback pages. Staff will thus need training on not only how to use the AI, but also how to narrow in on the most helpful aspects of its feedback, as well as what issues are most likely to arise for students in a variety of situations in interpreting their results and how to avert or resolve these. It seems risky and irresponsible to offer the AI to students without first enabling and supporting staff to fully familiarize themselves with the AI tool and gain a rich understanding of how its use must be structured to ensure high service quality.

### *Limitations and Directions for Future Research*

This project was useful for identifying several opportunities for future research. The research presented here was conducted with students enrolled in STEM-based and professionally designated co-op programs at one Canadian university. Co-op students were of interest because they often interact with career centers as part of their required job searches. In future research, it may be useful to explore the impacts of the AI with other student groups. For instance, there would be merit to further research involving students who aim to work in sectors that prize a range of approaches to individuality, creativity and problem-solving.

A limitation of study 2 was that students' use of feedback provided to them by the AI was not monitored. It can be only assumed that participants integrated feedback into their résumés, but this may not be the case. Further research could seek to understand how students choose to use the feedback that the AI provides to them. Such research could reveal whether there are necessary conditions under which using the AI leads to greater employment outcomes. For example, perhaps the feedback is useful only when students and staff co-create an action plan for integrating the feedback into the résumé.

The research presented here is also limited to indirect insights about employers. The quality of students' résumés is integral to employers' recruitment processes, and there is some evidence that the AI enhances the quality of students' résumés. It seems reasonable then that employers could prefer résumés that have been altered and/or organized based on AI-generated feedback over those that have been prepared by students alone. Future research could more directly explore employers' perceptions of résumés that have been corrected using AI-generated feedback.

Building on study 3, future research could examine how participation in a person-led intervention that builds connection and prompts self-reflection before accessing the AI influences subsequent responses to the AI. In our research, we found that accessing the AI primed students' attention to certain topics which shaped their interactions with staff. Do interactions with staff similarly prime students' attention to select feedback offered by the AI? Such research would be useful to understanding how AI can complement existing services.

Finally, future research could explore students' perceptions of AI from a cultural perspective and/or equity perspective. We note that WIL is an international phenomenon that takes place in many countries with students and employers all over the world. We need more research that examines how students in various cultural contexts might respond to the AI. Critically, it seems important to consider that some students' lived experiences include facing oppression through AI (e.g., facial

recognition) and being forced to use technology that is not helpful to them. For such students, AI based services may carry meanings that were not uncovered in the present research.

## Conclusion

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Opportunities for AI-based career services will continue to grow. Some such opportunities may be useful for some career services centers, depending on the purpose of the service, the intended audience, available resources, and other situational factors. The present research clarifies some of the impacts of an AI résumé critique, which may inform managers' decisions on whether to adopt such tools. Given the opportunity to use AI, many students did not capitalize. Those who did improved the quality of their résumés, at least according to the AI, especially in terms of how the résumé was organized. This seems to be a result of the feedback generated by the AI which focuses students' attention on issues with the mechanics of writing. However, AI résumé critique users did not fare better in a competitive job search than non-users. As well, adding the AI to an existing service offering did not improve the student experience. This suggests that the merits of AI-based résumé critiques to support WIL students during their job search processes are limited.

We learned that résumé critiques are not akin to transactional meetings in which staff mention errors in students' writing. They are not the same as offering writing tools that are popular today (e.g., Grammarly). Instead, they offer a personalized learning opportunity that helps students in several ways. In addition to specific feedback about students' résumé, staff help students identify strengths and interests, and they prepare students to be effective in interview and networking situations. These latter outcomes seem especially important to students' success in WIL job searches.

Ultimately, the results demonstrate the need for critical examination of new AI opportunities. Managers may be compelled to adopt AI into existing service models to increase the reach of their services. This seems especially likely given recent events and greater reliance on computer-mediated service delivery. The key message for managers is that research surrounding the impact of AI services on students' experiences and related outcomes is essential. We recommend that investments in AI career services to support WIL students require careful consideration. A key task for managers should be to examine the alignment between their organization's approach to résumé critiques and the feedback that AI-based résumé critiques can provide to WIL students.

# References

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- Aluthman, E. S. (2016). The effect of using automated essay evaluation on ESL undergraduate students' writing skill. *International Journal of English Linguistics*, 6(5), 54–67. <https://doi.org/10.5539/ijel.v6n5p54>
- Amundson, N., Westwood, M., & Prefontaine, R. (1995). Cultural bridging and employment counselling with clients from different cultural backgrounds. *Canadian Journal of Counselling*, 29(3), 206-213. <https://cjc-rcc.ucalgary.ca/article/view/58529/44028>
- Aoun, J. E. (2017). *Robot-proof: Higher education in the age of artificial intelligence*. MIT press.
- Arnuff, J. K., Tegner, L., & Larssen, Ø. (2010). Impression making by résumé layout: Its impact on the probability of being shortlisted. *European Journal of Work and Organizational Psychology*, 19(2), 221-230. <https://doi.org/10.1080/13594320902903613>
- Bailey, T. H., & Phillips, L. J. (2016). The influence of motivation and adaptation on students' subjective well-being, meaning in life and academic performance. *Higher Education Research & Development*, 35(2), 201-216. <https://doi.org/10.1080/07294360.2015.1087474>
- Bargh, J. A., & Chartrand, T. L. (2014). The mind in the middle: A practical guide to priming and automaticity research. In H. Reis & C. Judd (Eds.), *Handbook of research methods in social psychology* (p. 311-344). Cambridge University Press.
- Barney, M., & Madigan, J. (2019). *Rethinking coaching and emotions with new artificial intelligence*. Squarespace. <https://static1.squarespace.com/static/56dd8a952b8dde60536232ed/t/5dbb61d186752115895e6079/1572561365471/Rethinking+Coaching+and+Emotions+with+New+AI+LeaderAmp+2019.pdf>
- Beaubien, J.M., & Baker, D. P. (2004). The use of simulation for training teamwork skills in health care: How low can you go? *Quality & Safety in Health Care*, 13, 51-56. <http://dx.doi.org/10.1136/qshc.2004.009845>
- Cole, M. S., Rubin, R. S., Feild, H. S., & Giles, W. F. (2007). Recruiters' perceptions and use of applicant résumé information: Screening the recent graduate. *Applied Psychology: An International Review*, 56(2), 319-343. <https://doi.org/10.1111/j.1464-0597.2007.00288.x>
- Cox, A. M. (2021). Exploring the impact of artificial intelligence and robots on higher education through literature-based design fictions. *International Journal of Educational Technology in Higher Education*, 18(3). <https://doi.org/10.1186/s41239-020-00237-8>

- Crozier, S. D., & Lalande, V. (1995). *Cooperating with Coop*. Paper presented at the Canadian Association of College and University Students Services Conference, Guelph, ON.
- Dietsche, P., & Lees, J. (2017). *Insight into Canadian post-secondary career service models: Final report*. <https://ceric.ca/project/insight-into-canadian-post-secondary-career-service-models/>
- Drewery, D. W., Cormier, L. A., Pretti, T. J., & Church, D. (2019). Improving Unmatched Co-op Students' Emotional Wellbeing: Test of Two Brief Interventions. *International Journal of Work-Integrated Learning*, 20(1), 43-53. [https://www.ijwil.org/files/IJWIL\\_20\\_1\\_43\\_53.pdf](https://www.ijwil.org/files/IJWIL_20_1_43_53.pdf)
- Drewery, D. W., Pretti, T. J., & Church, D. (2021). Signaling 'student-oriented' job opportunities enhances job attractiveness in work-integrated learning programs. *Higher Education Research & Development*. <https://doi.org/10.1080/07294360.2020.1857346>
- Gallup. (2016). *Gallup-Purdue index report: Great jobs. Great Lives. The value of career services, inclusive experiences and mentorship for college graduates*. <http://www.gallup.com/reports/199172/gallup-purdue-index-report-2016.aspx?ays=n>
- Lalande, V., & DeBoer, J. (2012). Evaluation of an online psychoeducational career workshop. In R. Shea and R. Joy (Eds.), *A multi-sectoral approach to career development: A decade of Canadian research* (pp. 330-342). Canadian Journal of Career Development.
- Makela, J. P., Seo, G., Sun, H., & Rooney, G. S. (2014). *The value of using career services: A comparison of users and non-users*. The Career Center, University of Illinois at Urbana-Champaign. <https://www.careercenter.illinois.edu/sites/default/files/downloads/NASPARReport-Value-FINAL.pdf>
- McDow, L. W., & Zabrocky, K. M. (2015). Effectiveness of a career development course on students' job search skills and self-efficacy. *Journal of College Student Development*, 56(6), 632-636. <https://doi.org/10.1353/csd.2015.0058>
- McIlveen, P., Brooks, S., Lichtenberg, A., Smith, M., Torjul, P., & Tyler, J. (2011). Perceptions of career development learning and work-integrated learning in Australian higher education. *Australian Journal of Career Development*, 20(1), 32-41. [https://journals.sagepub.com/doi/pdf/10.1177/103841621102000105?casa\\_token=bQm3hkPoMu0AAAAA:8NxEcgosuTbxR-HCveMW15syFVnrUyCE-ZlKpNbZL7NfVJr8sJReocdmwMtcWZQgr69j2G5Mo4ZA](https://journals.sagepub.com/doi/pdf/10.1177/103841621102000105?casa_token=bQm3hkPoMu0AAAAA:8NxEcgosuTbxR-HCveMW15syFVnrUyCE-ZlKpNbZL7NfVJr8sJReocdmwMtcWZQgr69j2G5Mo4ZA)
- Nguyen, J., Sánchez-Hernández, G., Armisen, A., Agell, N., Rovira, X., & Angulo, C. (2018). A linguistic multi-criteria decision-aiding system to support university career services. *Applied Soft Computing*, 67, 933-940. <https://doi.org/10.1016/j.asoc.2017.06.052>

- Reddan, G., & Rauchle, M. (2012). Student perceptions of the value of career development learning to a work-integrated learning course in exercise science. *Australian Journal of Career Development*, 21(1), 38-48. [https://journals.sagepub.com/doi/pdf/10.1177/103841621202100106?casa\\_token=wxw9QoNcFpwAAAAA:xYMG7iQQRikqTALdbLlMSMNOCGLi23eu3bvUibio95A2vzXP24zUhuAvG-4W1rf1xwuQVPOkuX5](https://journals.sagepub.com/doi/pdf/10.1177/103841621202100106?casa_token=wxw9QoNcFpwAAAAA:xYMG7iQQRikqTALdbLlMSMNOCGLi23eu3bvUibio95A2vzXP24zUhuAvG-4W1rf1xwuQVPOkuX5)
- Reddan, G., & Rauchle, M. (2017). Combining quality work-integrated learning and career development learning through the use of the SOAR model to enhance employability. *Asia-Pacific Journal of Cooperative Education*, 18(2), 129-139. <https://files.eric.ed.gov/fulltext/EJ1151134.pdf>
- Reichheld, F. F. (2003). The one number you need to grow. *Harvard Business Review*, 81(12), 46-55. <https://pubmed.ncbi.nlm.nih.gov/14712543/>
- Reichheld, F. (2006). The microeconomics of customer relationships. *MIT Sloan management review*, 47(2), 73-78. <https://www.proquest.com/docview/224965299/654099852FDF44E5PQ/15?accountid=14906>
- Smith, C. D. (2016). The emergence and development of work-integrated learning (WIL): Implications for assessment, quality and quality assurance in higher education. In Ng, C., Fox, R., Nakano, M. (Eds.), *Reforming learning and teaching in Asia-Pacific universities* (pp. 337-364). Springer. [https://doi.org/10.1007/978-981-10-0431-5\\_16](https://doi.org/10.1007/978-981-10-0431-5_16)
- Smith, M., Brooks, S., Lichtenberg, A., McIlveen, P., Torjul, P., & Tyler, J. (2009). *Career development learning: Maximising the contribution of work-integrated learning to the student experience*. University of Wollongong. [https://eprints.usq.edu.au/5401/3/Smith\\_et\\_al\\_ALTC\\_Report\\_2009\\_PV.pdf](https://eprints.usq.edu.au/5401/3/Smith_et_al_ALTC_Report_2009_PV.pdf)
- Stevens, A. H., Kurlaender, M., & Grosz, M. (2019). Career technical education and labor market outcomes: Evidence from California community colleges. *The Journal of Human Resources*, 54, 986-1036. <https://doi.org/10.3368/jhr.54.4.1015.7449R2>
- Toporek, R. L., & Cohen, R. F. (2017). Strength-based narrative résumé counseling: Constructing positive career identities from difficult employment histories. *The Career Development Quarterly*, 65(3), 222-236. <https://doi.org/10.1002/cdq.12094>
- Watkins, L. M., & Johnston, L. (2000). Screening job applicants: The impact of physical attractiveness and application quality. *International Journal of Selection and Assessment*, 8(2), 76-84. <https://doi.org/10.1111/1468-2389.00135>
- Zeithaml, V. A., Berry, L. L., & Parasuraman, A. (1996). The behavioral consequences of service quality. *Journal of Marketing*, 60(2), 31-46. [https://journals.sagepub.com/doi/pdf/10.1177/002224299606000203?casa\\_token=FRdMemSFH3MAAAAA:EKsWsf4Pid3FQHf6jN5rAFCGiKzrZJALHU3ty1kaTxMOqt49GOzRFtwafihRZ71MtwKnWwkhDLs](https://journals.sagepub.com/doi/pdf/10.1177/002224299606000203?casa_token=FRdMemSFH3MAAAAA:EKsWsf4Pid3FQHf6jN5rAFCGiKzrZJALHU3ty1kaTxMOqt49GOzRFtwafihRZ71MtwKnWwkhDLs)

# Appendix A

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## *Staff Questionnaire (Study 1)*

*All questions were accompanied by a 5-point scale from 1 = not at all to 6 = very much*

1. How closely does the tone of the feedback in [Section 1] align with CCA?
2. How closely does the tone of the feedback [in Section 2] align with CCA?
3. How closely does the content of the feedback [in Section 2] align with CCA?
4. How closely does the tone of the feedback [in Section 3] align with CCA?
5. How closely does the content of the feedback [in Section 3] align with CCA?
6. How closely does the tone of the feedback [in Section 4] align with CCA?
7. How closely does the content of the feedback [in Section 4] align with CCA?
8. How closely does the tone of the feedback [in Section 5] align with CCA?
9. How closely does the content of the feedback [in Section] align with CCA?
10. Overall, how accurate did you feel that [the AI's] score was for this résumé?
11. Overall, how aligned was [the AI] to a typical CCA résumé critique?

# Appendix B

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## *Student Questionnaire (Study 3)*

1. To what extent did you feel knowledgeable with respect to the topic discussed BEFORE the meeting? (1 = “not knowledgeable” to 6 = “very knowledgeable”)
2. To what extent did you feel knowledgeable with respect to the topic discussed AFTER the meeting? (1 = “not knowledgeable” to 6 = “very knowledgeable”)
3. To what extent did you feel motivated with respect to the topic discussed BEFORE the meeting? (1 = “not motivated” to 6 = “very motivated”)
4. To what extent did you feel motivated with respect to the topic discussed AFTER the meeting? (1 = “not motivated” to 6 = “very motivated”)
5. We are interested in what you “learned” from your participation in this résumé critique. Please list below as many as three important things you have learned from the résumé feedback that you received.
6. How likely would you be to refer a résumé critique like this one to other co-op students who are preparing their résumés? (1 = “not at all likely” to 10 = “extremely likely”)
7. **What is your gender identity?**
  - a. Woman
  - b. Man
  - c. Trans
  - d. Two-spirit
  - e. Non-binary
  - f. Other
  - g. Prefer not to answer

**8. How would you describe yourself?**

- a. Arab
- b. Black
- c. Chinese
- d. Filipino
- e. Japanese
- f. Korean
- g. Latin American
- h. South Asian (including East Indian, Pakistani, Sri Lankan, etc.)
- i. Southeast Asian (including Vietnamese, Cambodian, Laotian, Thai, etc.)
- j. West Asian (including Iranian, Afghan, etc.)
- k. White
- l. Prefer not to answer
- m. Other, please specify: \_\_\_\_\_

**9. Do you identify as Indigenous to Turtle Island (e.g., First Nations, Métis, Inuit)?**

- a. Yes
- b. No
- c. Prefer not to answer

**10. Do you identify as LGBTQ+?**

- a. Yes
- b. No
- c. Prefer not to answer

**11. What was the average income of your main parent(s) or guardian(s) during childhood (in Canadian dollars)?**

- a. \$0 to \$20,000
- b. \$20,000 to \$34,999
- c. \$35,000 to \$49,999
- d. \$50,000 to \$74,999
- e. \$75,000 to \$99,999
- f. \$100,000 to \$124,999
- g. \$125,000 to \$149,999
- h. \$150,000 to \$199,999
- i. \$200,000 to \$249,999
- j. \$250,000 to \$299,999
- k. \$300,000+
- l. Prefer not to answer

# Appendix C

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## *AI Questionnaire (Study 3)*

1. How likely would you be to refer [the AI] to other co-op students who are preparing their résumés? (1 = “not at all likely” to 10 = “extremely likely”)
2. If you responded with an ‘8’ or above, on the previous question, please briefly describe why you would recommend [the AI] to another student:  
\_\_\_\_\_
3. We are interested in what you “learned” from using [the AI]. Please list below as many as three important things you have learned from [the AI] feedback that you received.

# Appendix D

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## *Staff Questionnaire (Study 3)*

- 1. Which of the following were topics of conversation during your interaction with this student? (0 = “no” and 1 = “yes”)**
  - a. Correct grammar and spelling
  - b. Format of the résumé
  - c. Bullet content (e.g., action verbs, “what-how-why”, results, quantifiable information)
  - d. Identifying skills within past experiences
  - e. Customization of the résumé to target specific jobs or industries
  - f. Other (please comment): \_\_\_\_\_
  
- 2. Which topics did you feel dominated the interaction for the greatest amount of time? Please indicate with a 1, 2, or 3, where 1 was the most central topic.**
  - a. Correct grammar and spelling
  - b. Format of the résumé
  - c. Bullet content (e.g., action verbs, “what-how-why”, results, quantifiable information)
  - d. Identifying skills within past experiences
  - e. Customization of the résumé to target specific jobs or industries
  - f. Other (please comment): \_\_\_\_\_
  
- 3. To what extent do you feel this student was knowledgeable about how to improve their résumé at the beginning of your meeting? (1 = “not knowledgeable” to 6 = “very knowledgeable”)**

4. To what extent do you feel this student was knowledgeable about how to improve their résumé by the end of the meeting? (1 = “not knowledgeable” to 6 = “very knowledgeable”)
5. To what extent do you feel this student was motivated to prepare a résumé at the beginning of the meeting? (1 = “not motivated” to 6 = “very motivated”)
6. To what extent do you feel this student was motivated to prepare a résumé by the end of the meeting? (1 = “not motivated” to 6 = “very motivated”)
7. Overall, to what extent did you feel that this student’s questions were “surface” (e.g., regarding formatting the résumé) versus “deep” (e.g., focused on customization strategies)? (1 = “mostly surface” to 7 = “mostly deep”)