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Effectiveness of Work-Integrated Learning Partnerships: Case Study of Cooperative Education in Agricultural Tertiary Education

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Abstract: The growing demand for promoting the role of higher education institutions in sustainability has contributed to creating new partnerships with other actors. In the field of education, the formation of cooperative education (co-op) partnerships was adopted as a strategy for work-integrated learning in cooperation with industry. This study investigated the effectiveness of co-op partnerships and the factors that influence them in the context of tertiary agriculture education in Saudi Arabia. A random sample of 130 co-op students was selected within the Bachelor of Agricultural Sciences delivered by the College of Food and Agriculture Sciences at King Saud University. The satisfaction level of students was explored in terms of four main areas, namely, the quality of the program design, organizational climate, personal and professional qualities, and program learning outcomes. The majority of students (70%) were highly satisfied with the quality of the program design, while they had a moderate level of satisfaction regarding the organizational climate of the co-op program (74.6%). Furthermore, 85.4% of students were highly satisfied regarding the learning outcomes they gained. The results also revealed that there were significant positive relationships between the level of satisfaction of students regarding program learning outcomes and their quality assessments of the program design, personal and professional qualities, and organizational climate. The measurement scale used in this study may assist in assessing the sustainability of co-op partnerships. Moreover, understanding the satisfaction level of students can help to identify areas that should be improved and, in turn, contribute to improving the governance and sustainability of co-op partnerships for all stakeholders.



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Keywords: work-integrated learning; partnerships; cooperative education; organizational climate; program design; professional and personal qualities; Saudi Arabia

1. Introduction

In the era of the knowledge-based economy and information society, the global demand for enhancing the role of higher education institutions (HEIs) in sustainable development has been growing [1]. Based on the literature, the role of HEIs in the transition to sustainability requires the integration of six main aspects into their functions: developing the institutional framework for sustainable development (mission, vision, strategic planning, and institutional policies) [2]; effective multidisciplinary, interdisciplinary, and transdisciplinary research to promote societal changes [3,4]; enhancing the quality of education for lifelong learning based on practical activities, simulating real-life problems, and cognitive learning practices [5,6]; incorporating sustainability into campus operations (green campuses) in terms of waste management, water management, energy use and energy efficiency, greenhouse gases, transport, food purchasing, accessibility for disabled people, and equality and diversity [7]; outreach activities to stimulate students and the community to think and act creatively for the benefit of the environment and society [8];

and assessing and sharing the results of HEI sustainability programs and actions to ensure transparency and increase progress toward sustainability [9,10]. This transformation toward sustainability requires deep integrative relationships between HEIs and other actors as a means to ensure the sustainable management of human, economic, and ecological capital [11].

HEI–industry partnerships have become one of the most significantly important agendas of collaboration at both national and institutional levels [12]. In recent years, the significant increase in partnerships between HEIs and firms has been promoted through the emergence of globalization, competition, and HEI budget restrictions [13]. Such cooperation involves the effective and efficient sharing of resources to achieve the mutual goals of technological innovation, promoting the exchange of knowledge, acting as an engine for economic growth, and enhancing global competitiveness [14,15]. Many examples of bilateral agreements between individual companies and HEIs are given in the literature, many of which have been underway for several decades. In this context, Cunningham and Link [16] highlighted that research-driven HEI–industry cooperation was widely adopted using five types, namely, the exchange and mobility of academics, joint activities in research and development (R&D), governance, entrepreneurship, and commercialization of R&D results; meanwhile, the curriculum design, development, and delivery of work-integrated learning (WIL) programs, continuing education and lifelong learning, and entrepreneurial education are the most important mechanisms in the field of education [17]. The present study considered the implementation of WIL for students in Saudi Arabia.

WIL programs extensively rely on the development of sustainable collaboration between HEIs, industry, and often the community [18]. This collaboration was an integral part of university education for many years to meet the growing need in firms in terms of a highly qualified workforce and for HEIs to adapt to the requirements of firms [13,15,19]. In some examples, this collaboration may result in a partnership; however, this is not always the case since this depends on many factors that may vary over time [20]. Such factors, including the availability of adequate resources (funding, human, and facilities); incentives gained to all partners; management support, mutual trust and commitment; capability of conflict management and the extent of change in clients' preferences or the type of services provided by the partnership overtime [14]. The main aim of WIL experiences is to facilitate the movement of students between the university and the public and private sectors to ensure a smooth and effective transition between business and university environments [21,22]. These programs can increase employability by providing students with hands-on experience in the workplace [20]. Furthermore, they promote knowledge transfer and attributes that can add value to their learning and career aspirations [23,24]. WIL denotes a wide range of partnerships, including co-ops, internships, community engagement, service-learning, work-based learning, teacher practicums, virtual projects, simulations, fieldwork, and clinical placements [25–27].

Cooperative education (co-op) as a form of WIL is one of the educational areas in which HEI–industry partnerships are of crucial importance and is vital to the knowledge-based economy [28]. According to Fleming and Hickey [29], a co-op can be defined as a structured method that focuses on the integration of knowledge and skills that are gained in classroom-based education and practical work experience in the workplace. Apart from technical skills, co-ops have a significant impact on gaining non-technical skills, such as interpersonal or communication skills, which are not easily acquired in a traditional classroom setting [30]. The main content of a co-op comprises two principles: First, developing student perceptions regarding the importance of career preparation and joining workplace settings before graduation [31]. Second, learning by doing to enhance graduate quality and alignment with labor market needs [32]. Globally, “co-op” is a common name that is widely used in the context of WIL; there are various forms that are based on this concept that may not be identical to the co-op concept introduced above but do offer some similarities and parallels, including sandwich programs, internship, work–study programs, work-based education, and experiential education [33–35].

As participation in co-op partnerships has been increasing in many HEIs, the issue of sustainability has become paramount, requiring practices and processes for developing and maintaining strong relationships [20]. Sustainable co-op partnerships are those that have the potential to be ongoing (rather than a one-off association), serve a mutually beneficial purpose, and achieve the satisfaction of all stakeholders [36,37]. For students, the effectiveness of co-op partnerships represents the extent of applying and developing classroom learning or theoretical concepts within work settings, self-confidence, and technical and non-technical skills that are developed in various disciplines [38–40]. Therefore, to ensure sustainable outcomes, it is necessary to measure the effectiveness of co-op partnerships and their effect on the academic achievement of students and enhanced employment opportunities [29,38,41].

Although several studies examined the benefits of co-op partnerships from various stakeholder viewpoints [42–47], most research focused mainly on the skills that were acquired and their effect on academic achievement. Limited research attempted to analyze the influence of the program design, organizational climate, and personal and physiological attributes on the effectiveness of co-op partnerships, in particular, in the Saudi context. Moreover, to determine the effectiveness of a co-op, it is necessary to conduct a systematic evaluation process. Although the students of the College of Food and Agriculture Sciences (CFAS) at King Saud University (KSU) submit a report after the end of the co-op period, in addition to the evaluation carried out by the host organizations, this is not sufficient to obtain an accurate and objective picture of the effectiveness of co-ops and the factors influencing their effectiveness. This is in addition to the scarcity of co-op studies conducted in the field of agriculture. Therefore, in this study, we aimed to provide a holistic understanding of the effectiveness of a co-op program offered by the CFAS, KSU. The objectives of this study were to identify the students' satisfaction levels regarding the factors influencing the effectiveness of the co-op program, determine the effectiveness of the co-op program regarding supporting academic achievement, and explore the relationship between student satisfaction levels regarding the factors that influence a co-op and the effectiveness of the co-op program.

2. Theoretical Framework

This section presents the relevant literature in three main areas. First, we review the general characteristics of a co-op, including its meanings and the associated benefits for all stakeholders. Second, we review the literature that considered different views on measuring the outcomes of co-op programs. Finally, the literature review concludes with previous work on factors that influence the effectiveness of co-op partnerships, highlighting the potential roles of the quality of program design, organizational climate, and personal and professional qualities.

2.1. *co-op Partnerships*

Historically, the idea of bridging the gap between theory and practice was first introduced by professor Herman Schneider in 1904, who initially launched a co-op program in engineering education at the University of Cincinnati in the United States [48]. According to the American National Commission for Co-operative Education [49], a co-op is a structured program that allows students to fulfill college credits while acquiring valuable skills in the workplace in their major area of study. A co-op is a partnership between HEIs, employers, and students, with specified responsibilities for each partner [29]. Universities coordinate with partners to host undergraduates in short-term positions at their companies [33]. The host organizations provide an engaging learning opportunity for the students, supervision, and feedback [50]. The idea of co-op education is pertaining to the content of Vygotsky's theory of Social Constructivism [51]. According to this theory, sequential steps should be followed to enhance the learning process [52]. First, a good teacher/supervisor at the workplace identifies a learner's zone of proximal development "the distance between the actual developmental level as determined by independent problem solving and the level of

potential development as determined through problem-solving under adult guidance, or in collaboration with more capable peers” and helps him/her stretch beyond it. Second, the teacher gradually withdraws support until the learner can perform the task independently. Finally, the teacher provides an environment that enables students to do harder tasks than would otherwise be possible. Learning is a distinguishing feature of a co-op compared with other experiences gained from training and working experiences [53]. In this sense, meeting the needs of students and aligning the program with the intended learning outcomes are among the drivers that contribute to the establishment of co-op partnerships for sustainability [19]. To maximize the benefits from a co-op, being a well-prepared student who has completed three years of study or is at the end of their program is a prerequisite for engaging in a co-op program [54].

A co-op, as an educational strategy, provides benefits to all stakeholders. For students, the benefits involve a combination of non-technical and technical skills, as well as helping students to define and refine their career paths [23,29,33,41]. From the HEI side, the benefits include integrated theoretical classroom learning with work experiences, enhanced relationships with other actors, and improved student retention by connecting students to career options in the market [55–58]. In the same vein, reasons such as building reputation and gaining high recognition, applying a practical and effective recruitment strategy, enhanced relations with the HEIs and the faculty, and increased employee retention due to the extensive period of observations are the most significant justifications of employers for maintaining such partnerships [14,32,38,40,41].

2.2. Effectiveness of co-op Partnerships

The effectiveness of programs or partnerships could be described as an interconnected chain that consists of five steps: measurement, evaluation, feedback, results, and systematic improvement of results [59]. In the context of co-op partnerships, measuring the outcomes resulting from the partnership is an essential step to achieve partnership sustainability for different reasons, including monitoring resources, supporting the university’s accountability in the partnership, and summarizing the lessons learned [60,61]. From the student’s perspective, the effectiveness of a co-op program is determined by two main kinds of results: program learning outcomes and professional and occupational development [49]. Program learning outcomes were conceptualized as improved personal and professional skills and attitudes, both technical and non-technical [62], which were adopted for measuring the effectiveness of the co-op experiences in this study. To measure such skills and attitudes, Ormord [63] mentioned that a co-op partnership should be evaluated in the context of the relevance of students in terms of utility value and relatedness. According to [32], utility value explains the usefulness of the content and how it fits into the plans of students in both the short and long term. Relatedness, on the other hand, emphasizes the ability of students to find a link between what they learn in the classroom with job roles and responsibilities at work [63]. Therefore, co-op students should perceive the utility value and relatedness before joining a work setting [32]. The literature provides various examples of potential student benefits that are gained as a result of their participation in a co-op program, including enhanced technical experiences in their major field of study, improved learning, taking responsibility for learning, learning how to learn, improved communication skills, increased disciplinary thinking, increased commitment to educational goals, improved problem solving, improved analytical thinking, improved performance in the classroom, and increased cumulative grade point average (GPA) [29,40,41,49,62]. Regarding professional and occupational development, a co-op partnership can have a positive influence on student retention, career selection, the types and requirements of jobs, and skill gaps that should be addressed [62,64–66]. Interestingly, in this sense, some previous studies [49,67,68] confirmed that students with higher experience benefit from participation in co-ops in terms of having an advantage in their starting salary.

2.3. Factors Influencing the Effectiveness of co-op Partnerships

2.3.1. Quality of the Program Design

The quality of the program design is a critical determinant for co-op partnership sustainability [54]. Ensuring the quality of the design of a co-op experience requires implementing the best practices in three main areas: planning, the work experience itself, and evaluation/reflection [69]. Finding the right partner is the first step in co-op experience planning. Tennyson et al. [70] argued that finding a suitable partner not only assists with achieving the objectives of the partnership, combines complementary skills and resources, and ensures a beneficial relationship but also builds trust-based collaboration. Therefore, HEIs should adopt partner-selection criteria that are best suited to implementing a co-op partnership, achieving the objectives of the partnership, and considering the nature of work experiences [10,37]. Furthermore, determining the legal form of agreement is another critical point in the planning stage. According to Donohue [54], co-op partnerships can be classified into two types: informal partnerships (e.g., short-term programs approved by letters of association) and formal contractual arrangements (e.g., memorandum of understanding, terms of reference, or contracts) [71]. Such arrangements are essential for governance structure promotion to effectively manage the partnership and resolve internal conflicts [72]. Additionally, the type of partnership management is another determinant that should be taken into consideration in the planning stage. In this regard, Wilson [73] suggested that three models could be followed for the management of HEI co-op programs, namely, the integrated model, the decentralized model, and the centralized model. The integrated model includes a multifaceted approach of coordination that is relative to the institution, employers, and students. This approach could be conducted by decentralizing the academic administration and instructional matters such that they are under the control of each respective faculty instead, as well as centralizing employer and marketing administration within the co-op department [74]. On the other hand, the centralized model involves a single structure in faculties that independently operates both academic and non-academic affairs, student placement, marketing, and academic oversight [73]. In the decentralized model, full responsibility for the administration of the management, placement, marketing, and counseling is placed within the faculties, with little or no central support structures [74]. Regarding the work experience, HEIs should align the co-op working experiences with the learning objectives and expectations of students [22,39,49]. Furthermore, student preferences regarding the types of placements should be reviewed and addressed whenever possible [13,29,57,74]. Another area of concern regarding working experiences is designing co-op programs that are based on students gaining a variety of skills that enrich their experiences [33,59]. This could be achieved by acquiring experiences in more than one department within the host organization(s), or by conducting the co-op period with more than one placement [22,31,62,64]. Finally, as noted by Dressler and Keeling [75], co-op learning outcomes have to be assessed according to the objectives of student learning, the type of systematic learning experience gained, and the extent of the achievement of the students.

2.3.2. Organizational Climate

An organizational climate can be viewed as a set of attributes and attitudes that describe an individual's experiences in an organization regarding various components or dimensions [76]. These dimensions include the dominant orientation, interpersonal relationships, conflict management, individual autonomy, the organizational control system, the organizational structure, task- or relations-oriented management, the rewards and punishments, communication, and innovation and risk-taking level [77,78]. In most cases, such dimensions overlap and are not mutually exclusive [79]. The approach by which these components operate determines the underlying philosophy of the organization's management [80]. In the context of a co-op, the organizational climate affects co-op students regarding their experiences in both HEIs and host organizations. In HEIs, the organizational climate affects the attitudes of co-op students toward the co-op setup

and configuration preparation, co-op duration, supervision system, co-op objectives and expected learning outcomes, assessment methods, and selection of placements [29,49]. On the other hand, components such as the supervision system, communication with co-workers and supervisors, tasks, workload, work hours, individual autonomy, support level, and recognition are among the most important organizational climate areas to assess among co-op students regarding host organizations [20,33,41,58,62]. The organizational climate can affect the behavior of co-op students in the HEIs and host organizations by impacting their attitudes, satisfaction, and performance [20,31]. Thus, measuring the extent of influence of the organizational climate on co-op student satisfaction is an important step for achieving student learning outcomes and program improvements [48,50,64,74].

2.3.3. Personal and Professional Qualities

Personal qualities are the attributes, characteristics, or personality traits of an individual. These qualities refer to the inner abilities of an individual and are described as soft skills, meaning that they are intangible and difficult to define [81,82]. Many personal skills should be developed by students, the most important of which can be summarized as follows: effective communication, problem-solving and creativity, interpersonal abilities (e.g., relationship building and relationship management), teamwork skills, diversity sensitivity, adaptability and flexibility, positive attitude and energy, and self-confidence [81,83]. Professional skills, on the other hand, are specific competencies that are taught in school or on the job, including computer programming, foreign languages, writing skills, or machine skills [84,85]. These are commonly called technical skills or hard skills [82]. In the context of a co-op, both types of skills are highly important for building relationships and improving day-to-day interactions with colleagues and supervisors, teamwork, and group dynamics [86]. Furthermore, employers are very much interested in assessing the personal and professional skills of co-op students in cooperation with HEIs to ensure their adaptation to the work environment, their assimilation into the placement, conflict management skills, and accountability [87,88]. Consequently, co-op students must adjust themselves, according to the professional environment by integrating personal and professional skills into co-op experiences [33]. Such integration facilitates the better implementation of student conceptual knowledge in the workplace [89,90]. Obviously, the personal and professional quality levels of students are among the factors that affect the success of co-ops, as well as in students gaining the intended learning outcomes [64,74,88].

In this study, as shown in Figure 1, four areas were descriptively tested to illustrate the current situation of the effectiveness of the co-op in the case study: the quality of the program design, personal and professional qualities of the students, organizational climate, and program learning outcomes. According to the literature review, we hypothesized that the first three factors have a positive effect on the program learning outcomes.

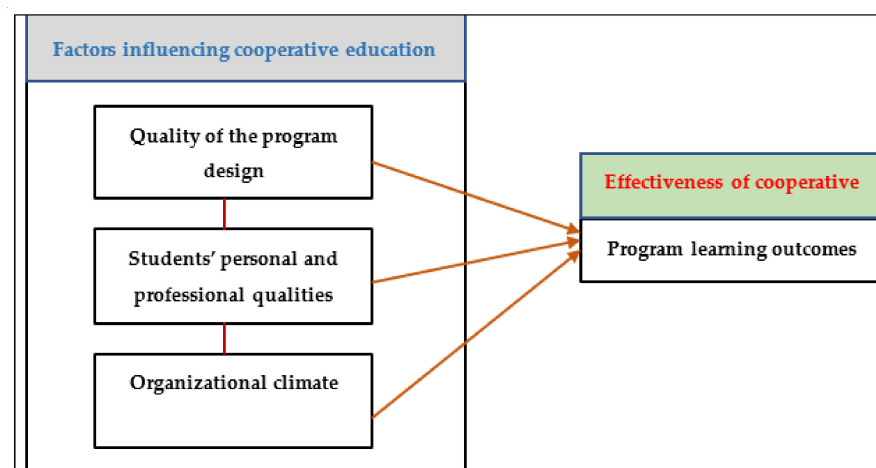


Figure 1. Conceptual framework of the study.

3. Methodology

3.1. Study Design

The case study approach was adopted to provide a rich description of the perceptions and experiences of the respondents to develop a unique understanding of events [91]. Stake [92] argued that researchers can generalize the results of their case into the future and across other settings. The intrinsic case study that was examined in this research was a co-op program within the Bachelor of Agricultural Sciences (BAS) at CFAS, KSU, in Saudi Arabia. We used survey research for the research design in this study. The survey was administered to a sample of students within this program to describe the effectiveness of the co-op partnerships. A cross-sectional survey type was followed to collect data at one point in time; examine the individual self-reported opinions; and analyze population trends, test questions, or hypotheses [93]. To provide a clear understanding of the context, a full description of the case study is provided below.

3.2. Case Description

Co-op programs within the BAS degree that is delivered by the CFAS, KSU, are all elective co-op programs, except for the Nutrition and Food Science program. This means that students enrolled in the Nutrition and Food Science program are required to complete the number of co-op terms specified in the program of study to be eligible for obtaining the BAS degree. The co-op aims to provide highly qualified graduates to the food and agricultural industries. This aim was achieved by setting the following objectives: supporting students toward gaining practical experience before graduation, deepening their understanding of classroom material, taking responsibility for the tasks they perform during the industry attachment, preparing students to interact with members of the community, acquiring effective communication skills, providing information to private and public institutions about the quality of human resources, and finally, providing opportunities for employment after graduation [94].

To become a candidate for student registration in the co-op program, five academic requirements should be met as follows: complete 85 credits in a science degree program before the period of the cooperative program, have a GPA of at least two points, should not be suspended from studying at the university, conform to the requirements of the departments, and finally, complete the co-op training period before their last semester at the university. Students may be exempted from the last condition if they provide strong justifications and are approved by the department and by the vice president for academic affairs [95].

The duration of training is 27 weeks. The involved students undertake 780 h of placement within one agriculture, food, or health organization over one semester, including the summer period. The co-op was undertaken in two different entities, each taking thirteen weeks. Students can join the program in two periods: the beginning of the second semester to the end of the summer or the beginning of the summer period to the end of the first semester. The co-op experience is generally undertaken five days per week during the seventh level of the degree. The college is responsible for coordinating with entities for the placement of students [94].

Students select the entity from the list of organizations that have engaged with the college for partnerships. The process of selection is facilitated by the department and the final placement is determined based on the entity's final approval. A workshop is conducted before the beginning of the co-op period for each group. The purpose of this workshop is to assist in preparing for their co-op experience, as well as providing guidance for the assessment tasks that accompany their industry placement. The supervising process of the program is implemented by both the college and the host organization. An industry supervisor supports the student during the placement. In addition, students are also expected to meet with their academic supervisor every two weeks [94].

3.3. Sampling Procedure

All students who had completed their agriculture co-op experience in the academic years of 2018/2019 and 2019/2020 were invited during their final session of the year to participate in the study (n = 185). Consequently, the questionnaires were sent to these students. A total of 130 completed questionnaires were returned to the researchers, providing a 70% response rate for the survey.

3.4. Data Collection Instrument

The data collection tool involved semi-structured questionnaires with students after completing their co-op experience. The items of the questionnaire were developed based on a literature review [12,19,38,55,64,83]. To ensure the content validity of the questionnaire, three panel experts from the committee of the co-op were invited to review the questionnaire. Furthermore, a pilot study prior to processed final data collection was conducted. Thirty co-op students were selected randomly for the pilot study. The main aim of the pilot study was to ensure the suitability of the questionnaire for achieving the study's objectives by analyzing the reliability and construct validity of the instrument. All students involved in the pilot study were excluded from the final analysis. The reliability of the questionnaire was assessed by measuring the internal consistency using Cronbach's alpha coefficient. The value of Cronbach's alpha of the scales of quality of program design, personal and professional qualities, organizational climate, and program learning outcomes were 0.81, 0.89, 0.82, and 0.91 respectively. These values are all greater than 0.7, indicating high reliability and good internal consistency [96]. To measure the construct validity of the instrument, the item-to-total correlations, and the inter-item correlations were calculated, as shown in Appendix A. According to Robinson [97], if the score of the inter-item correlations is more than 0.30 and the item-to-total correlations exceed 0.50, the construct validity is satisfied. The findings presented in Appendix A showed that all items included in the scales achieved acceptable levels of the item-to-total correlations and the inter-item correlations. Hence, all items (47 items) were included in the final analysis. This study was conducted in accordance with the Human Ethics Committee of King Saud University. Accordingly, this committee, as per the approval memo Ref# HEC 2020/133, provided the required ethics approval to conduct this study.

The questionnaire consisted of three sections. Section 1 included a profile of the students in terms of their major, grade level, GPA, age, and host organization. Factors influencing the effectiveness of the co-op partnership were presented in Section 2. The index of items that described these factors included 32 items divided into three areas: quality of the program design (nine items), personal and professional qualities (seven items), and organizational climate (16 items). The items of program learning outcomes gained from the co-op experience (15 items) were presented in Section 3. Each item of the scale represented a widely recommended practice that reflects the effectiveness of a co-op program.

Data were collected via an online survey during the period from January to March 2021. The purpose of the study and the contact details of the researchers were provided in an information sheet within the questionnaire. The e-questionnaires were shared with the selected students by e-mail and WhatsApp. Four weeks were given to the sample students to complete the questionnaire. At the end of this period, 39 responses were received back without any reminders. The authors sent a reminder to all non-responding students after four weeks, and a further two weeks were given to fill in the questionnaires. Another 68 responses were delivered. Finally, a second reminder was sent to the respondents with another two weeks to fill in the questionnaires, and 23 responses were received within this period. Overall, a total of 130 responses were received.

3.5. Variable Measurement and Data Analysis

Students were asked to determine the extent of their satisfaction for each item on a five-point Likert-type scale, ranging from strongly agree (5) to strongly disagree (1). The

summed scores of each sub-scale (i.e., quality of program design, personal and professional qualities, organizational climate, and program learning outcomes) were calculated and converted into a percentage to determine the satisfaction level of students regarding the effectiveness of the co-op program in each component. Student satisfaction was classified into three categories, as follows: high (>75%), medium (50–75%), and low (<50%). For example, the summated score of the program design (nine items) is ranging from a minimum of 9 to a maximum of 45. The summated score of the program design was classified into three groups as follows: low (9–22 points), moderate (23–33 points), and high (34–45 points). We analyzed the data using the Statistical Package for Social Sciences software (IBM SPSS, ver. 25.0, IBM Corp., Armonk, NY, USA). The data were described using frequencies, percentages, means, and standard deviations. Pearson's coefficient of correlation was employed to measure the relationships between the program learning outcomes and factors influencing co-ops. Furthermore, an analysis of variance (ANOVA) was performed to determine the differences in respondent satisfaction levels, regarding program learning outcomes and GPA groups.

4. Results

4.1. Profile of the Respondents

Table 1 shows the demographic profile of the respondents. There were 114 (87.7%) students majoring in food science and nutrition, 12 (9.2%) majoring in plant production, and only 4 (3.1%) students majoring in animal production. The percentage of students in grade levels seven and eight were 13.1 and 86.9%, respectively. The average age was 23.09 years. Moreover, most students (60%) had obtained a grade point average (GPA) ranging from 3 to 4, with a mean of 3.47 points. In terms of the host organizations, the multiplicity and diversity of the fieldwork of these organizations were observed (Table 1). Of the 260 organizations that were identified by the respondents, 114 entities (43.8%) belonged to the food industry. The other entities included hospitals (33.5%), laboratories (10.4%), plant production companies (9.2%), and animal production and manufacturing industries (3.1%).

Table 1. Demographic profile of the respondents.

Variable	Number of Students = 130	
	Frequency	Percentage
	Major	
Food science and nutrition	114	87.7
Plant production	12	9.2
Animal production	4	3.1
	Grade level	
Seven	17	13.1
Eight	113	86.9
Age (years) (min. = 21, max. = 26, mean = 23.09, SD = 1.75)		
Younger than 22	35	26.9
22	58	44.6
23	21	16.2
Older than 23	16	12.3
Grade point average (GPA) (min. = 2.33, max. = 4.76, mean = 3.47, SD = 0.69)		
Less than 3	30	23.1
3–4	78	60
More than 4	22	16.9
	Host organization * (sum = 260)	
Hospitals (civil and private)	87	33.5
Laboratories (civil and private)	27	10.4
Food companies	114	43.8
Plant production companies	24	9.2
Animal production and manufacturing industry	8	3.1

* More than one answer was allowed and the percentages were calculated according to the number of entities.

4.2. Factors Influencing the Effectiveness of the co-op Program

4.2.1. Quality of Program Design

Table 2 presents the means and standard deviations of the students' opinions regarding the quality of the co-op program's design. The quality of the co-op program design is crucial for meeting the students' needs and expectations, as well as the overall efficiency of the program. As shown in Table 2, the respondents were highly satisfied with the quality of the program design based on the overall mean score of 3.89. For all nine statements being assessed (Table 2), except for "the training period in the entity was sufficient for practical benefit" (mean 3.22, SD 1.3), respondents considered the quality of program design to be high. In general, the findings revealed that a majority of students (70%) believed that the co-op program was designed at a high level (Figure 2), whereas more than a quarter of the surveyed students (26.9%) reported an average level of satisfaction regarding the co-op design, and only 3.1% indicated a low level of satisfaction.

Table 2. Quality of the program design from the point of view of the respondents.

	Quality Items (Q)	Mean	SD
Q1	The design of the co-op program was aligned with my educational needs.	4.38	0.8
Q2	A co-op program was conducted in more than one entity to ensure a diversity of experiences.	4.12	1.07
Q3	The criteria by which students are evaluated were announced and clarified before beginning the co-op program.	4.08	1.01
Q4	The training contents were designed based on the training objectives.	3.76	0.96
Q5	The assessment of the co-op program was based on the acquired knowledge and skills.	3.92	0.68
Q6	The co-op program was carried out in more than one department within the entity joined.	3.92	1.1
Q7	Evaluation of the co-op included measuring the most important strengths and weaknesses.	3.88	1.02
Q8	Student expectations and concerns were discussed before formulating training objectives.	3.88	1.1
Q9	The training period in the entity was sufficient for practical benefit.	3.22	1.3
	Overall mean	3.89	0.98

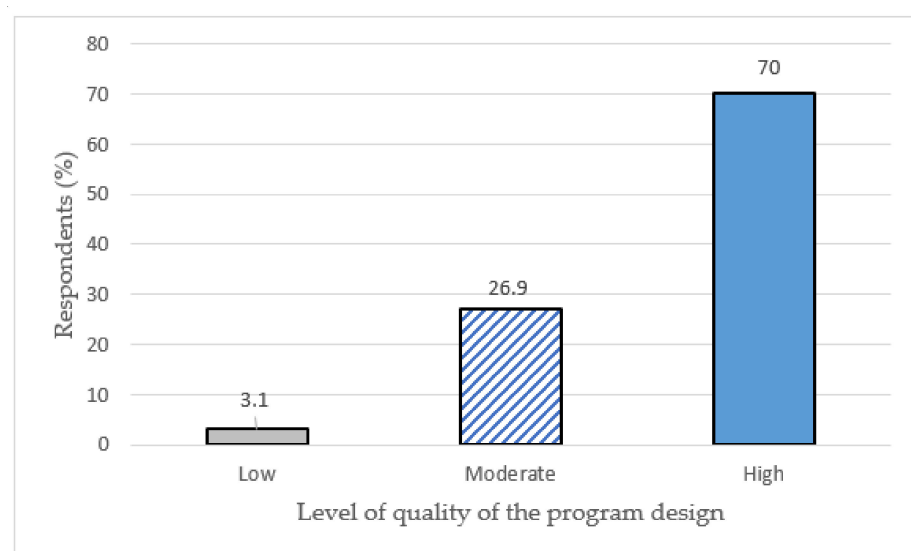


Figure 2. Classification of students according to their opinions on the level of the quality of the program design.

4.2.2. Personal and Professional Qualities

The overall mean for personal and professional qualities in our study was 3.69 (Table 3), indicating that students considered their qualities to be at a moderate level. The personal and psychological characteristics of students during the period they spent in the different co-op entities played an important role in their acquisition of different educational experiences, consequently ensuring the quality of the co-op process. The assessment of the three statements pertaining to the personal and professional qualities (Table 3) indicated that respondents considered their level of personal and professional attributes during the training period as being of high quality regarding their motivation to gain knowledge and skills (mean 4.51, SD 0.68), seriousness and discipline (mean 4.3, SD 0.66), and feeling proud and honored to be trained in agricultural agencies related to their specialization (mean 4.23, SD 0.93); meanwhile, they were less satisfied with other statements, which they indicated as being of average quality. In summary, the results indicated that more than half of the respondents (53.1%) believed that they had an average level of personal and professional characteristics necessary to acquire various experiences during the co-op program (Figure 3), while the rest of the sample of students (46.9%) reported that they had a high level of personal and professional qualities.

Table 3. The availability of personal and professional qualities from the point of view of the respondents.

	Personal and Professional Items (P)	Mean	SD
P1	I felt more motivated to gain the knowledge and skills required during the training period.	4.51	0.68
P2	I was serious and disciplined during the training period in the entity.	4.3	0.66
P3	I felt proud and honored to be trained in agricultural agencies related to my specialization.	4.23	0.93
P4	I handled the pressure at work effectively.	3.48	1.2
P5	I dealt professionally with difficult personalities in the workplace environment.	3.56	1.2
P6	The courses delivered at the college assisted in improving my understanding of some aspects of the work in the entity I joined.	3.07	0.86
P7	My level of English language proficiency allowed me to do tasks effectively and facilitated my communication with the employees in the entity.	2.73	1.3
	Overall mean	3.69	1.03

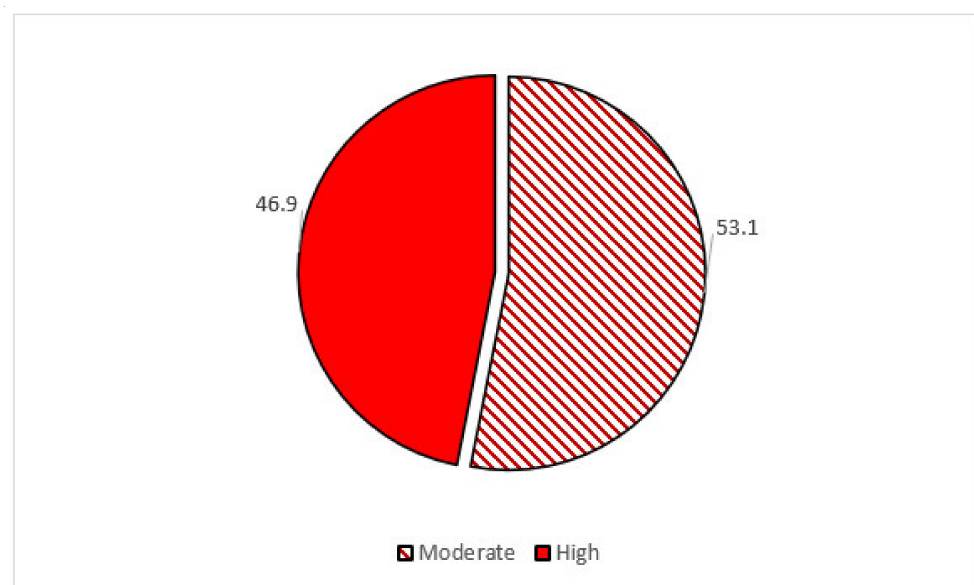


Figure 3. Classification of students according to their opinions on their level of personal and professional qualities.

4.2.3. Organizational Climate

The organizational climate, whether within the CFAS at KSU or the host organization, played an important role in enhancing the quality of the co-op experience. In this context, the results presented in Table 4 indicate that the students were moderately satisfied with the organizational climate of the co-op program (mean 3.15). Statements with the highest relevance, ranked in order of satisfaction, were “my co-workers treated me with respect and appreciation” (mean 4.5, SD 0.7), “the entity conducted a periodic follow-up for students in the workplace” (mean 4.22, SD 0.9), and “the college provided a preparatory course to introduce the co-op program before starting it” (mean 4.1, SD 1.18). The student satisfaction levels regarding the organizational climate shown in Figure 3 indicate that approximately three-quarters of the respondents (74.6%) reported that they were moderately satisfied with the organizational climate, whether at the college or the training destination (Figure 4); meanwhile, less than a quarter of them (23.8%) indicated a high level of satisfaction and only 1.5% of the respondents had a low level of satisfaction regarding the organizational climate.

Table 4. Assessment of the organizational climate from the point of view of the respondents.

	Organizational Climate Items (O)	Mean	SD
	B1. College		
O1	The college conducted a periodic follow-up in the workplace.	4.08	1.02
O2	The college provided a preparatory course to introduce the co-op before starting it.	4.1	1.18
O3	The administration supported my requests regarding the co-op program.	3.83	1.04
O4	I could choose the training locations according to my preferences.	2.82	1.3
O5	Clear objectives that should be achieved by the end of co-op program were set.	2.66	1.1
	B2. Host organization		
O6	My co-workers treated me with respect and appreciation.	4.5	0.7
O7	The entity conducted a periodic follow-up for students in the workplace.	4.22	0.9
O8	I got a certificate after finishing the co-op program.	4.08	1.2
O9	A business card was quickly issued.	3.98	1.2
O10	I was treated as an employee in the entity with specific powers.	3.8	1.08
O11	Convenient places were available for me in the entity that I joined.	3.25	1.3
O12	The coaching body gave me the confidence to perform the tasks without a supervisor.	2.81	1.3
O13	The entity allowed me to be trained in various departments within the entity.	2.67	1.2
O14	Managers empowered, motivated, and valued employee suggestions.	2.57	1.3
O15	The entity allowed for the filming and photographing of technical tasks during the training period.	2.45	1.2
O16	The working hours were representative of life in the agriculture industry.	3.55	0.88
	Overall mean	3.15	1.12

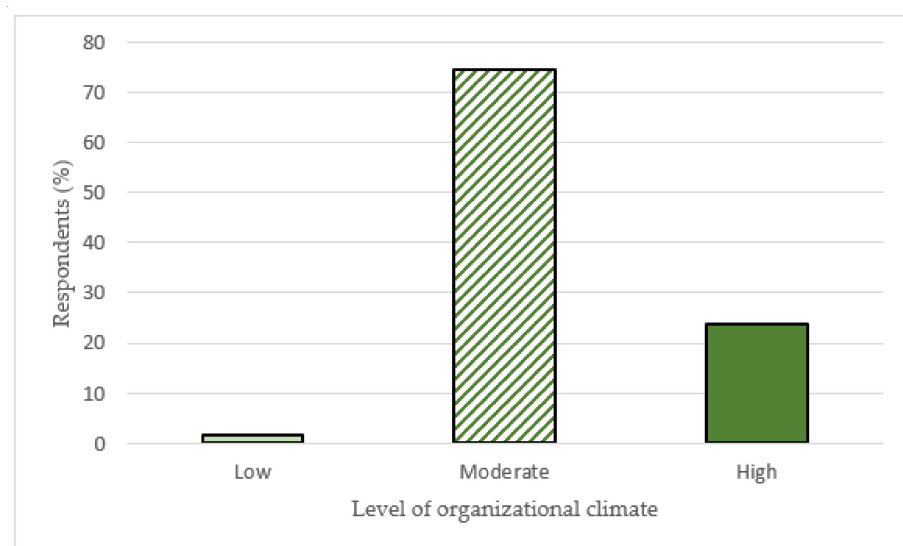


Figure 4. Classification of students according to their opinions on the level of the organizational climate.

4.3. The Effectiveness of the co-op Program

Table 5 shows the satisfaction level of students regarding the co-op learning outcomes. The results indicated the high effectiveness of the co-op program in supporting the academic achievement of students, as the respondents mainly reported being highly satisfied with all statements pertaining to the program learning outcomes. The five most important aspects of outcomes developed at the end of the program according to the students were as follows: self-reliance in performing job tasks (mean 4.43, SD 0.58), high satisfaction of supervisors with the job tasks that the students implemented (mean 4.39, SD 0.67), acquiring new methods and methods for solving technical and non-technical work problems (mean 4.38, SD 0.59), developing communication skills with colleagues and clients (mean 4.34, SD 0.66), and identifying future work patterns in the field of specialization and job requirements (mean 4.33, SD 0.77). In general, the vast majority of respondents (85.4%) were highly satisfied regarding the learning outcomes that were gained (Figure 5); meanwhile, 13.8% indicated that they had moderately benefited from program learning outcomes and only 0.8% of the respondents indicated that they had acquired a low level of outcomes.

Table 5. Assessment of the program learning outcomes from the point of view of the respondents.

	Learning Outcomes Items (L)	Mean	SD
L1	I could rely on myself to perform the job duties.	4.43	0.58
L2	I got high satisfaction from the supervisors about the assigned job tasks.	4.39	0.76
L3	I acquired new ways and methods for solving technical and non-technical business problems.	4.38	0.57
L4	I developed communication skills with my colleagues.	4.34	0.66
L5	I learned about future work patterns in the field of specialization and job requirements.	4.33	0.71
L6	I increased my knowledge of quality systems and standards.	4.32	0.71
L7	I learned how to make non-routine decisions in the work environment.	4.32	0.88
L8	I improved my report-writing skills.	4.29	0.78
L9	I learned appropriate decision-making skills for different business problems.	4.28	0.69
L10	I developed time-management skills.	4.28	0.79
L11	I increased my interest in the educational material in my major.	4.27	0.82
L12	I improved my understanding of the courses to a large extent.	4.24	0.89
L13	I understand safety regulations and professional standards.	4.25	0.79
L14	I enhanced my learning by integrating theory and practice.	4.25	0.81
L15	I am familiar with modern techniques and technology used in the field of work.	4.15	0.76
	Overall mean	4.3	0.74

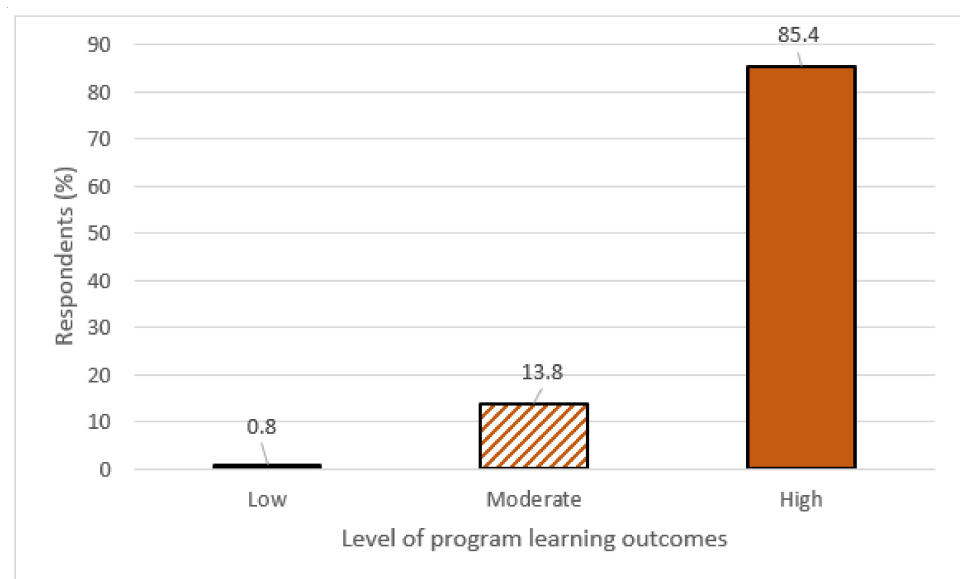


Figure 5. Classification of students according to their opinions on the level of program learning outcomes.

In terms of the most important technical skills that were acquired from the co-op program, Figure 6 indicates the diversity and multiplicity of skills that students benefited

from during the co-op period. The practices with the highest relevance rankings in the field of food science and nutrition were, in order of relevance: applying food safety analysis methods (57%), identifying and working on various modern devices (44.7%), understanding and implementing quality control tasks (37.7%), and applying the Saudi food specifications (35.1%). Regarding the plant production field, the results in Figure 6 show that the plant production students reported that the most important skills that they acquired were the handling and maintenance of farm machinery and equipment (66.7%), developing fertilization programs (66.7%), disease and pest control (50%), and greenhouse management (50%). Finally, from the perspective of students, the most important skills related to animal production included assessing animal feed needs (75%), incubating and hatching eggs (50%), and good husbandry practices (50%).

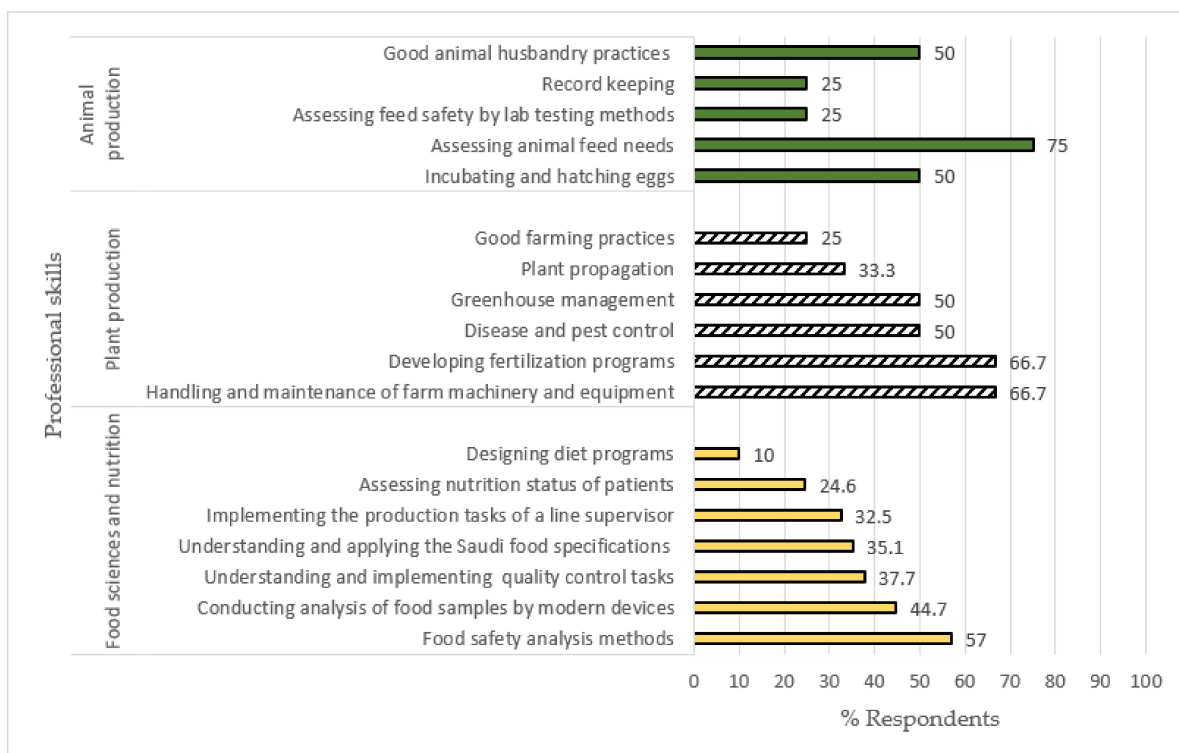


Figure 6. Technical skills acquired from the co-op program from the respondents' perspectives.

4.4. Relationships between the Dimensions of the co-op Program and the Learning Outcomes

Table 6 depicts the relationship between the co-op dimensions (quality of program design, personal and professional qualities, and organizational climate) and the satisfaction level of the respondents regarding the program learning outcomes. The findings indicated that there was a moderately significant positive relationship ($p < 0.01$) between student satisfaction levels regarding the program learning outcomes and their assessment of the quality of the program design ($r = 0.17$, $p < 0.01$), personal and professional qualities ($r = 0.38$, $p < 0.01$), and organizational climate ($r = 0.54$, $p < 0.01$).

Table 6. Correlations of the effects of variables on the satisfaction of respondents with the program learning outcomes.

Construct	Satisfaction of Program Learning Outcomes	
	r	p-Value
Quality of the program design	0.58 **	0.00
Personal and professional qualities	0.38 **	0.00
Organizational climate	0.54 **	0.00

** $p < 0.01$.

4.5. Differences in Effectiveness of the co-op Program according to Students' GPAs

An examination of the differences in the effectiveness of the co-op program according to the students' GPAs is presented in Table 7. According to the one-way ANOVA ($F(2, 118) = 2.79, p\text{-value} > 0.05$), we observed no significant differences between the GPA groups in terms of the students' opinions on the effectiveness of the co-op program.

Table 7. Analysis of variance (ANOVA) table.

	Sum of Squares	df	Mean Square	F	p-Value
Between groups	535.73	2	267.866		
Within groups	11,320.371	118	95.935	2.79	0.065
Total	11,856.103	120			

5. Discussion

The results gained from this study are expected to support the Saudi 2030 vision theme (sustainable education) and its strategic objectives: support university–industry partnership establishment, enhance the quality of education via the alignment of learning outcomes with market needs and enable HEIs to achieve more societal change [98]. Furthermore, this study made a unique contribution to the literature by analyzing how public and private actors seek to engage with HEIs for sustainability and where institutional gaps remain.

5.1. Quality of the Program Design

High satisfaction of the students regarding the quality of the co-op design was observed in this study. Among the items of the quality program design, the sufficiency of the training period in the entity showed a moderate level of satisfaction. This may have been because the time required for the applied benefits varied according to the educational experience gained in different entities. The majority of students spent the co-op period in two different entities (i.e., three months in each entity). This period may not have been enough to provide sufficient experience in certain areas. These results are consistent with those of Fleming and Hickey [29], who showed the high satisfaction (81%) of sports science students in Australia in terms of the quality of the design of a co-op program. In the same sense, the findings of Nurhadi et al. [99] also revealed that the roles and responsibilities of the co-op program at the Kotabaru Technical University in Indonesia were clearly announced and assigned among the stakeholders, and the program was designed in light of the needs and training objectives of the students.

5.2. Personal and Professional Qualities

The motivation to learn various practical experiences was highly observed among students. This result reflected the students' need for practical training to apply the theoretical knowledge they had acquired during their university studies. This result was confirmed by the responses of students regarding the quality of practical lessons in the university (Table 3), where the statement "the courses delivered at the college assisted in improving my understanding of some aspects of the work in the entity I joined" was among the lowest perceived qualities in terms of satisfaction. This may have been due to the dependence of the educational curricula on lecturing as the main teaching method, which is not suitable for increasing the student's memory of the presented scientific material or improving their ability to perform various skills. In general, the results showed that the level of personal and professional qualities of students could assist them in understanding and interacting in the work environment and, in turn, enhance the effectiveness of the co-op program. It was clear from the results relating to personal and professional qualities (Table 3) that there was no noticeable discrepancy in the characteristics of the respondents, which may have been due to the convergence of the level of communication skills for students as a result of socialization, training programs, or self-learning that the students acquired to interact professionally with others; it may also have been due to their academic abilities,

interest, and readiness to learn. These results are consistent with the study of Jackel [69], who discussed how the characteristics of students enrolled in a co-op course in the Department of Sociology (criminology major) at Western Kentucky University, USA, affected the effectiveness of the co-op program. The results of the study indicated the full commitment of students to attending the specified hours daily, commitment to the work rules of the various authorities, behavioral discipline, and their ability to apply what they learned in analyzing and interpreting various phenomena.

5.3. Organizational Climate

The results highlighted that choosing the training locations according to student preferences was one of the weaknesses of the organizational climate of the co-op program from the college's perspective. This may have been due to the willingness of many students to join specific reputable companies. Such companies can only receive a limited number of students in each period. Consequently, there were difficulties in meeting the desires and preferences of all students in some cases. Furthermore, there were other preferences related to the students themselves, such as proximity to the place of residence and, therefore, it was difficult to respond to all student preferences when choosing the co-op placements. Similarly, setting prior goals for each student that they must achieve during the co-op program was another example of the obstacles faced by the respondents. Prior knowledge of students regarding the educational aspects upon which they will be evaluated helped them to better prepare and to get to know them better during the training period. At the level of the organizational climate in the host organization, the results indicated several obstacles, specifically, allowing filming and photographing inside the training places, having the confidence to perform tasks without a supervisor, diversity of training in various departments within the entity joined, empowering and motivating students, and valuing employee suggestions. This result may have been because the host organization worked with students as temporary affiliates who did not have sufficient experience, thus limiting the powers entrusted to them or taking their requests less seriously. Such barriers may have affected the practical benefits the students received from the co-op program. Therefore, serious attention to student requests, which can be coordinated between the college and the host organization, allows for reducing these obstacles whenever possible. These results are in agreement with the study of Morrison [31], who presented the attitudes of international students at the University of Regina in Canada toward co-ops, where the students pointed out several challenges that they faced during the co-op period, such as the difficulty of finding suitable workplaces, the long number of working hours, the cultural difference within the work environment, and the difficulty experienced when interacting with some workers within the work environment. It is clear from the previous results that several obstacles affected the quality of co-ops, which require strong cooperation between the college and the partners to reduce their potential negative effects on the potential benefits of the students. In general, the previous results showed an average level of student satisfaction with the organizational climate. This result is in line with Luo, Chau, Lam, Huang and Kou [55], who reported that the students of the University of Macau in China that were enrolled in a co-op program in the field of hospitality and tourism indicated an average level for the organizational climate of the program, where the overall mean of the organizational climate was 2.76 and ranked third in the order of the dimensions of the effectiveness of the co-op program.

5.4. Program Learning Outcomes

Our findings indicated that students rated their benefit from the co-op outcomes at a high level, indicating the effectiveness of the co-op program regarding achieving its objectives. These results are in agreement with Jiang, Lee and Golab [39], who indicated that the evaluations of the entities for co-op students that were enrolled in a Canadian University were at a high level. The most important learning outcomes that were perceived by the students were the quality of interactions with supervisors, the ability to be self-

reliant when performing job tasks, the desire to learn, conflict management, and adaptation to the work environment. In the same vein, as indicated by the study of Noyes, Gordon and Ludlum [50], there was a significant difference between engineering students who joined the co-op program at Carnegie University, USA, and those who did not join the program regarding personal and professional skills. Another study, which was conducted in Thailand by Luekitinan [33], found that there were significant differences between students who joined the co-op program at Purva University compared with students who did not join the program in terms of leadership and problem-solving skills.

It was concluded that students with higher educational attainment scored higher on the items related to the cooperative, personal and psychological characteristics, and organizational climate dimensions. This finding reflected the effectiveness of the co-op program in supporting academic achievement. Similar results were reported in the study of OZEK [58], which showed a positive significant relationship between the design of the co-op program at Namek Kemal University in Turkey and the academic achievement of the students. The results also highlighted that there were no significant differences in acquiring learning outcomes between the students according to their age or academic achievement. This result implied that the students benefited from the co-op program, regardless of their educational attainment before enrollment, indicating the significant impact of the co-op program on improving the professional experiences of the students.

The present study had some limitations that should be acknowledged. This paper depended upon only self-reporting measures to determine students' satisfaction regarding the effectiveness of the co-op program, which has its own drawbacks [100,101]. Furthermore, this paper includes only the views of the co-op students. Indeed, including the various perspectives of college co-op supervisors and host organizations could help in improving our understanding regarding the factors influencing the effectiveness of co-op partnerships.

6. Conclusions

In this study, we explored the effectiveness of co-op partnerships that were established between the CFAS, KSU, and other actors in Saudi Arabia. As this topic has rarely been covered in the literature regarding the context of Saudi Arabia, this study contributed to the existing body of knowledge in the field of the sustainability of co-op partnerships by highlighting the extent of the effect of three dimensions, namely, the quality of the program design, organizational climate, and personal and professional qualities on the satisfaction of co-op students regarding the learning outcomes gained. The findings of this study concluded that students were highly satisfied regarding their co-op experiences. Furthermore, special attention should be given to the design of the co-op program in terms of the number and type of learning outcomes that should be gained and the period of the co-op in each workplace to meet the expectation that co-op students would transfer their learning from the classroom to the workplace. We also observed that the level of personal and professional qualities of the students before joining the co-op experience was a catalyst for their integration into the co-op environment and gaining the intended learning outcomes. Additionally, maximizing the benefits from co-op experiences requires analyzing the barriers that were identified by co-op students regarding the organizational climate.

The results provided four useful implications for practice that need to be implemented by the college in cooperation with other actors. First, we reinforce the importance of personal and professional skills for success in the co-op workplace experience among students. Second, we stress the importance of conducting a co-op course as a mandatory course for all programs. Third, developing a co-op program by linking the period of co-op experiences in each workplace with the intended learning outcomes to enable the students to transfer this learning more effectively. Fourth, conducting continuous coordination between the college and co-op supervisors in the departments to overcome the difficulties that students face during the co-op program, especially regarding workplace experiences in different departments within the host organization, allowing photography and filming, and giving the necessary confidence to co-op students so they can perform various tasks.

Including the various perspectives of all stakeholders regarding the factors influencing the effectiveness of co-op partnerships should be highlighted in future studies. Moreover, how the intended learning outcomes may be influenced by students who have a selective, rather than a mandatory, co-op experience should be considered. Conducting a comparison between the effectiveness of entrepreneurial education and co-ops as types of WIL would add another dimension as well.

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Institutional Review Board Statement: This study was conducted in accordance with the Human Ethics Committee of King Saud University. Accordingly, this committee, as per the approval memo Ref# HEC 2020/133, provided the required ethics approval to conduct this study.

Informed Consent Statement: Not applicable.

Data Availability Statement: Data are contained within the article.

Conflicts of Interest: The authors declare no conflict of interest.

Appendix A

Table A1. Corrected item-total correlation of the quality of program design construct.

Items	r
Q1	0.601
Q2	0.673
Q3	0.587
Q4	0.677
Q5	0.561
Q6	0.581
Q7	0.705
Q8	0.533
Q9	0.587

Table A2. Corrected item-total correlation of the personal and professional qualities construct.

Items	r
P1	0.544
P2	0.539
P3	0.577
P4	0.621
P5	0.619
P6	0.543
P7	0.603

Table A3. Corrected item-total correlation of the organizational climate construct.

Items	r
O1	0.544
O2	0.539
O3	0.577
O4	0.621
O5	0.619
O6	0.543
O7	0.603
O8	0.544
O9	0.539
O10	0.577
O11	0.621
O12	0.619
O13	0.543
O14	0.603
O15	0.544
O16	0.594

Table A4. Corrected item-total correlation of the program learning outcomes construct.

Items	r
L1	0.591
L2	0.507
L3	0.618
L4	0.622
L5	0.624
L6	0.629
L7	0.611
L8	0.598
L9	0.582
L10	0.633
L11	0.640
L12	0.613
L13	0.567
L14	0.559
L15	0.622

Table A5. Inter-item correlation matrix of the quality of program design construct.

Items	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9
Q1	1.000								
Q2	0.484	1.000							
Q3	0.392	0.311	1.000						
Q4	0.334	0.540	0.382	1.000					
Q5	0.360	0.438	0.333	0.506	1.000				
Q6	0.409	0.368	0.428	0.444	0.392	1.000			
Q7	0.522	0.574	0.554	0.517	0.488	0.412	1.000		
Q8	0.389	0.588	0.422	0.455	0.378	0.554	0.388	1.000	
Q9	0.384	0.566	0.433	0.388	0.402	0.602	0.365	0.472	1.000

Table A6. Inter-item correlation matrix of the personal and professional qualities construct.

Items	P1	P2	P3	P4	P5	P6	P7
P1	1.000						
P2	0.602	1.000					
P3	0.414	0.355	1.000				
P4	0.384	0.487	0.363	1.000			
P5	0.465	0.427	0.373	0.386	1.000		
P6	0.302	0.422	0.449	0.508	0.402	1.000	
P7	0.530	0.323	0.399	0.481	0.505	0.380	1.000

Table A7. Inter-item correlation matrix of the organizational climate construct.

	O1	O2	O3	O4	O5	O6	O7	O8	O9	O10	O11	O12	O13	O14	O15	O16
O1	1.000															
O2	0.352	1.000														
O3	0.602	0.451	1.000													
O4	0.281	0.367	0.460	1.000												
O5	0.303	0.424	0.321	0.529	1.000											
O6	0.504	0.268	0.473	0.425	0.602	1.000										
O7	0.516	0.372	0.511	0.456	0.525	0.337	1.000									
O8	0.378	0.545	0.279	0.305	0.339	0.540	0.484	1.000								
O9	0.422	0.527	0.505	0.278	0.471	0.321	0.533	0.392	1.000							
O10	0.307	0.415	0.347	0.444	0.452	0.508	0.609	0.534	0.288	1.000						
O11	0.522	0.428	0.564	0.596	0.432	0.447	0.558	0.430	0.385	0.323	1.000					
O12	0.469	0.627	0.482	0.322	0.369	0.463	0.477	0.375	0.625	0.385	0.510	1.000				
O13	0.533	0.355	0.662	0.434	0.528	0.321	0.326	0.684	0.547	0.364	0.302	0.320	1.000			
O14	0.422	0.620	0.637	0.329	0.442	0.364	0.508	0.422	0.317	0.536	0.389	0.266	0.362	1.000		
O15	0.295	0.441	0.345	0.513	0.541	0.579	0.412	0.329	0.346	0.304	0.412	0.596	0.346	0.403	1.000	
O16	0.409	0.341	0.410	0.497	0.325	0.564	0.438	0.444	0.409	0.372	0.386	0.460	0.474	0.311	0.644	1.000

Table A8. Inter-item correlation matrix of the program learning outcomes construct.

	L1	L2	L3	L4	L5	L6	L7	L8	L9	L10	L11	L12	L13	L14	L15
L1	1.000														
L2	0.544	1.000													
L3	0.514	0.504	1.000												
L4	0.590	0.468	0.421	1.000											
L5	0.519	0.528	0.492	0.545	1.000										
L6	0.547	0.589	0.658	0.379	0.623	1.000									
L7	0.466	0.608	0.554	0.303	0.704	0.518	1.000								
L8	0.427	0.587	0.388	0.340	0.552	0.597	0.458	1.000							
L9	0.507	0.536	0.369	0.362	0.447	0.636	0.436	0.588	1.000						
L10	0.501	0.425	0.504	0.381	0.463	0.678	0.388	0.566	0.328	1.000					
L11	0.403	0.370	0.426	0.406	0.435	0.547	0.395	0.507	0.367	0.396	1.000				
L12	0.422	0.552	0.466	0.477	0.383	0.507	0.478	0.605	0.472	0.467	0.384	1.000			
L13	0.398	0.505	0.462	0.429	0.428	0.469	0.605	0.621	0.451	0.508	0.657	0.438	1.000		
L14	0.384	0.566	0.433	0.388	0.402	0.602	0.365	0.472	0.365	0.365	0.365	0.365	0.365	1.000	
L15	0.384	0.566	0.433	0.388	0.402	0.602	0.365	0.472	0.365	0.365	0.365	0.365	0.365	0.365	1.000

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