

# Investigating the Status of a Competency-Based Agricultural Higher Education System in Iran

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## Abstract

*Competency-based education (CBE) represents a crucial approach for aligning educational systems with community requirements. The approach is founded on principles that delineate the essential attributes of key educational components: educators, learners, curriculum, and learning environment. In light of the ongoing challenges within Iran's agricultural higher education system to synchronize academic instruction with community needs, this study investigates the status of the competency-based agricultural higher education system in Iran. The population in this quantitative research included all educators and students in Iran's public agricultural schools and government employers in the agricultural sector. Sample educators and students were selected using a multistage sampling method, while purposeful sampling was used to select employers. Data were collected using two questionnaires: one related to educators and students, and one related to employers. The validity and reliability of the tools were assessed and confirmed by a panel of experts using Cronbach's alpha test, and data analysis was performed in SPSS version 22. We found that the characteristics related to the relationships between the various pillars of the agricultural higher education system and the external environment, like professional and management skills, were unfavorable. This indicates that graduates lack the necessary skills to effectively engage with industry professionals and manage agricultural enterprises. On the other hand, characteristics associated with the internal functions of the educational system, such as scientific ability and personal skills, were favorable. This suggests that the educational system is more successful in developing students' academic knowledge and personal competencies than empowering them to enter the labor market.*

## Introduction

The new generation of academics strives to extend its role beyond teaching to include training for social participation. Accordingly, universities are expected to move from an emphasis on education toward serving the community and optimally communicating with other parts of society. This shift in emphasis can allow academic centers to train students to fulfill the community's needs and ensure that graduates from higher education programs are able to take responsible positions in society (Wilson, 2013; Sam & Van Der

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Sijde, 2014; Ganoidis & Meek, 2020). Competency-based education (CBE) is one educational approach that universities use to align their programs with the community's needs. The goal of this approach is to prepare learners to work successfully in the community, based on the establishment of a demand-driven relationship between the education system and the labor market (Ramasamy, 2020).

If CBE is a goal of the higher education system, all the pillars of the education system (educator, learner, curriculum, and learning environment) must be aligned with that goal (Saadvandi et al., 2024; Khoshnodifar et al., 2020). According to Brauer (2021), achieving this alignment requires a clear articulation of competences that meet both educational and working-life expectations. The study emphasizes the importance of in-service training for educators to effectively implement competence-based curricula, and highlights the need for a supportive learning environment that fosters the development of these competences.

In Iran, a significant challenge in agricultural higher education is the mismatch between the delivered education and community needs, while graduates of this system make up a limited share of the agricultural labor market (Sookhtanlou, 2020). As various studies show, the different pillars contribute to this mismatch between agricultural higher education and labor market needs, as described below.

**Educators:** Educators play an essential role in the learning process. After all, even if learners receive the desired curriculum in a suitable learning environment, educators still play a decisive role in terms of learning quality. Improving teaching quality is one way to increase graduates' employability. However, studies show that educators in the Iranian agricultural higher education system have not performed well, and their lack of skills in preparing learners for the market forms a barrier to agricultural graduates' employment (Movahedi et al., 2013; Movahedi, 2017).

**Learners:** Many Iranian higher education applicants are accepted into fields that do not match their interests and talents, with agriculture being the 36th choice out of 100 (Shahvali & Abedi Sarvestani, 2014). This mismatch leads to poor performance in the labor market post-graduation. The higher education system plays a crucial role in fostering interest and motivation in students, which can potentially increase their success. However, high agricultural unemployment rates, coupled with studies on the quality of agricultural graduates, indicate that the system is not performing well. Specifically, weaknesses of agricultural graduates include a lack of market-required skills (Shahbazi & Alibaygi, 2006; Movahedi, 2009), practical experience, and self-confidence in job hunting. Graduates also prefer urban employment, have unrealistic expectations (e.g., high-salary jobs) (Baraabadi et al., 2010), are poorly motivated to enter the agricultural sector, and are reluctant to engage in group work (Movahedi, 2017).

**Curriculum:** Studies have shown that the curriculum offered in the Iranian agricultural higher education system does not match the country's agricultural labor market (Movahedi, 2017; Aghapour et al., 2014; Movahedi et al., 2013; Zamani & Azizi, 2006; Shahbazi & Alibaygi, 2006) and cannot provide sufficient practical experience for learners (Movahedi et al., 2010; Baraabadi et al., 2010). Furthermore, it does not provide career prospects for graduates and provides no explicit mechanism for them to use their technical knowledge after graduation (Aghapour et al., 2014). Instead, it offers theoretical and abstract content that does not meet the actual needs of the labor market and does not generate a proper understanding of how graduates can use what they have learned at the university in their future careers.

**Learning environment:** This pillar of Iran's agricultural higher education system strongly contributes to the mismatch between agricultural education and the labor market. Establishing communication between the university and the labor market would increase opportunities to adapt the learning environment to real-life conditions. This would better align educational experiences with those encountered in the labor market, which would have many benefits (e.g., laying a foundation for using knowledge, creating mechanisms to increase learners' skills, and providing learners with knowledge about social issues related to agricultural

professions). Communication is often limited to internship courses held at institutions outside the university, and research has shown that the quality of these short internship courses (which are worth two credits) is largely inadequate (Shahvali & Abedi Sarvestani, 2014; Gholamireza, 2010; Zarafshani et al., 2008; Sadeghi et al., 2010). Research on the optimal relationship between the agricultural faculties of Iran and the labor market outside the university has found an ‘islanding’ effect (Movahedi, 2017; Movahedi et al., 2010; Shojaei, 2009; Ostovari, 2002); in other words, the learning environment in agricultural education is abstract and static due to a lack of suitable communication with industry partners.

Given the current situation in agricultural higher education in Iran, CBE—which is based on mutual communication between the educational system and the labor market—could help to align the agricultural higher education system with the labor market. Specifically, Chappell et al. (2020) emphasize that CBE in agribusiness degrees supports the development of graduates who are better prepared for the demands of the labor market. Moreover, they highlight the importance of integrating skills, knowledge, and strategies for attitude change into the curriculum to produce competent graduates. Similarly, Mather et al. (1977) discuss the development of a competency-based curriculum in agricultural economics, noting that such curricula are designed to meet the specific needs of the labor market by focusing on the desired outcomes and competences required by employers. Therefore, aligning the pillars of the education system (educator, learner, curriculum, and learning environment) with CBE principles is essential for achieving the goal of producing graduates who are not only knowledgeable but also possess the practical skills and attitudes necessary to excel in their professional careers.

### **Theoretical Framework**

Mulder (2004) designed a set of primary principles for implementing CBE, which was further expanded and adjusted by Wesselink (2010) and Sturing et al. (2011). Different variables correspond to each principle in a set of expanded principles that facilitate CBE through operationalization. Educational systems can use the principles and variables determined for CBE as an operational guideline to create CBE and take steps toward the mission of serving the community (Table 1).

**Table 1***Competency-Based Education Principles and Variables*

<b>Principles</b>	<b>Variables</b>
1. The competences on which the program is based are defined.	Construction of a competence profile. Use of the competence profile in curricula development.
2. Vocational core problems are the organizing unit for (re)designing the curriculum (learning and assessment).	Role of vocational core problems in curricula development. Role of vocational core problems in assessment.
3. Learning activities take place in a range of authentic situations.	Authenticity. Variation. Connection between learning in school and learning in practice.
4. Knowledge, skills, and attitudes are integrated in learning and assessment processes.	Integration of knowledge, skills, and attitudes.
5. The competence development of students is assessed before, during, and after the learning process.	Assessment of prior competences. Formal rewarding. Provision of feedback.
6. Students are challenged to reflect on their own learning.	---
7. Self-responsibility and self-reflection are encouraged in students.	Self-responsibility. Self-reflection. Students' learning questions.
8. The study program is flexible.	Flexibility in assessment time and method.
9. Teachers fulfill their roles as coaches and experts equally at school and in professional practice.	Coaching on the learning process. Coaching on the content.
10. The study program devotes attention to learning, career, and citizenship competences.	Development of professional identity. Development of learning competencies.

References: Sturing et al., 2011; Wesselink, 2010

The principles and variables above comprise a general set that an educational system must consider to achieve competency. However, the specific features of an educational system's pillars are not defined. In a review study, Saadvandi et al. (2019) defined an organized set of characteristics for each educational pillar in a competency-based agricultural education system, based on CBE principles. They analyzed 126 articles and extracted the characteristics of the different pillars (Table 2).

Table 2

*Characteristics of Pillars in the Competency-Based Higher Education System*

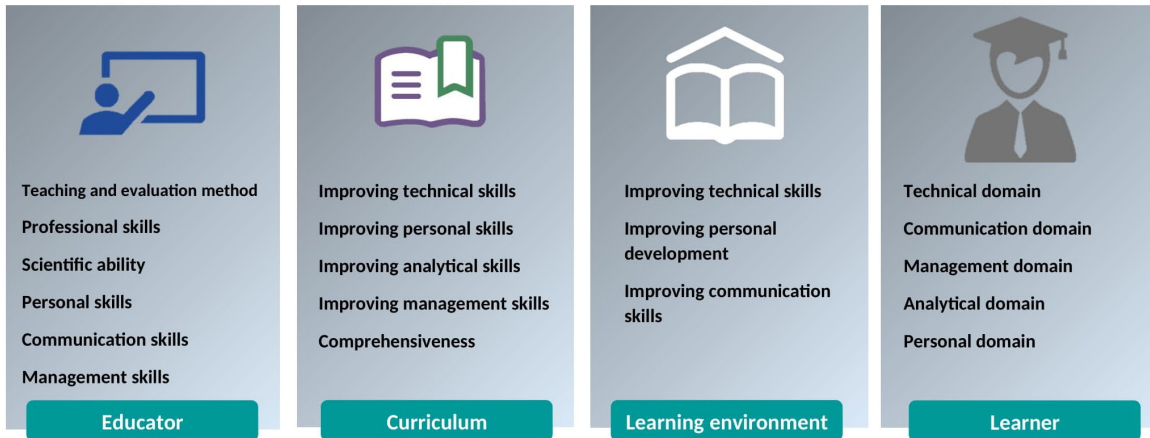
Educational pillar	Major characteristics	Theoretical basis of CBE	
		Principles	Variables
<b>Educator</b>	Teaching and evaluation method	Teachers fulfill their roles as coaches and experts equally at school and in professional practice.	Coaching on the learning process. Coaching on the content.
	Professional skills		
	Scientific ability		
	Personal skills		
	Communication skills		
<b>Curriculum</b>	Management skills	Vocational core problems are the organizing unit for (re)designing the curriculum (learning and assessment). Learning activities take place in a range of authentic situations. Knowledge, skills, and attitudes are integrated.	Role of vocational core problems in curricula development. Role of vocational core problems in assessment. Authenticity. Variation. Connection between learning in school and learning in practice.
	Improving technical skills		
	Improving personal skills		
	Improving analytical skills		
	Improving management skills		
<b>Learning environment</b>	Comprehensiveness	Vocational core problems are the organizing unit for (re)designing the curriculum (learning and assessment). Learning activities take place in a range of authentic situations.	Role of vocational core problems in curricula development. Role of vocational core problems in assessment. Authenticity. Variation. Connection between learning in school and learning in practice.
	Improving technical skills		
	Improving personal development		
<b>Learner</b>	Improving communication skills	The study program devotes attention to learning, career, and citizenship competences.	Development of professional identity. Development of learning competencies.
	Technical domain		
	Communication domain		
	Management domain		
	Analytical domain		
	Personal domain		

References: Sturing et al., 2011; Wesselink, 2010

This set of characteristics of the competency-based agricultural higher education system's pillars forms the theoretical foundation of this research (Figure 1). In this study, we determine the degree of alignment between the characteristics of the Iranian agricultural higher education system's pillars and those of a competency-based agricultural higher education system's pillars, aiming to provide solutions to enhance this alignment.

**Figure 1**

*Characteristics of Each Pillar of the Competency-Based Higher Education System (Saadvandi et al., 2024)*



### Research objectives

The primary objective of this study is to investigate the status of a competency-based agricultural higher education system in Iran. The goal is a comprehensive analysis from multiple perspectives, including those of educators, learners, and employers. By examining the perceptions of these key stakeholders, we seek to identify strengths, weaknesses, and areas for improvement in the implementation of CBE. Specifically, the research addresses the following questions:

- What is the status of educators in the competency-based agricultural higher education system in Iran, as perceived by both educators and learners?
- What is the status of curriculum in the competency-based agricultural higher education system in Iran, as perceived by both educators and learners?
- What is the status of learning environment in the competency-based agricultural higher education system in Iran, as perceived by both educators and learners?
- What is the status of learners in the competency-based agricultural higher education system in Iran, as perceived by employers?

### Methodology

This study aims to investigate the status of a competency-based agricultural higher education system in Iran. A quantitative approach was employed, utilizing structured questionnaires to gather data from three groups of participants: educators, learners, and employers. The questionnaires for educators and learners were designed to assess the educators, the curriculum, and the learning environment, and were identical for both groups. A separate questionnaire was used to evaluate learners from the perspective of employers.

### Rationale for Participant Groups

Teachers and learners were selected to provide opinions on the three pillars of the higher education system: educators, learning environment, and curriculum. This is because they are directly involved in and affected by these components. Furthermore, employers were asked to evaluate learners, as they interact with graduates in the workplace and can provide valuable insights into the competencies and preparedness of the learners' post-graduation. The average ages of the participants were 25.12 years for learners, 45.37 years for educators, and 43.71 years for employers. Most respondents in the learners group were women

(62%), while most respondents in the educator and employer groups were men (76.8% and 77.5%, respectively).

### Participant Selection and Sampling

A multistage sampling method was applied to select samples. In the first step, we considered five geographical regions determined by the Country Education Evaluation Organization (2015) and randomly selected one university from each region: The University of Tehran from region 1, the Ferdowsi University of Mashhad from region 2, the Razi University of Kermanshah from region 3, the University of Ilam from region 4, and the University of Shiraz from region 5. If the number of educators in a region was lower than the required sample size, we selected two universities from that region: thus, we added the University of Birjand, Hamedan University, and Lorestan University in regions 2, 3, and 4, respectively. The samples related to each group were determined by stratified random sampling. Statistical information and sampling methods related to each of the three groups are provided below.

**Students:** In 2017–2018, an estimated 81,629 students were studying agriculture at Iran's public universities at the BSc, MSc, and PhD levels (Mirabi, 2019). Based on Krejcie and Morgan's (1970) sampling table, we selected 384 individuals. The number of samples per class was determined using a stratified sampling method with proportional allocation. In the next stage, we determined the number of students from the selected universities based on level of education, and each level was allocated to one class to balance the sampling process. A stratified sampling method with proportional allocation was also applied in this stage. Table 3 shows the universities selected from each region, the number of students by education level, and the sample size in each category.

**Table 3**

#### *Population of Learners at the Selected Universities*

Region	University	Population				Sample			
		BSc	MSc	PhD	Total	BSc	MSc	PhD	Total
1	Tehran	627	305	666	1,598	43	21	46	110
2	Ferdowsi	1,611	998	1,557	4,166	36	22	34	92
3	Razi	1,109	383	320	1,812	54	19	16	89
4	Ilam	1,373	571	72	2,016	45	19	3	67
5	Shiraz	1,016	668	863	2,547	10	7	9	26
<b>Total</b>		5,736	2,925	3,478	12,139	188	88	108	384

**Educators:** In 2017–2018, there were a reported 3,640 educators in the agricultural field at public universities (Mirabi, 2019). Our sample size was determined to be 351 based on Krejcie and Morgan's (1970) sampling table. Table 4 presents information related to academic regions, selected universities, and the sample size from each university.

**Table 4***Population of Educators at the Selected Universities*

Region	University	Sample size
1	Tehran	110
2	Ferdowsi	44
	Birjand	26
3	Razi	32
	Bu-Ali Sina	47
4	Ilam	22
	Lorestan	43
5	Shiraz	27
<b>Total</b>		<b>351</b>

**Employers:** Given the multiplicity of private and public employers in the agricultural sector and the difficulty in determining the statistical population and access to samples, we only selected public sector employers (affiliated with the Ministry of Agriculture) as the statistical population. We asked them about the characteristics of agricultural graduates who enter the labor market after completing their university education. We identified public departments and organizations that are the targeted potential employers of agricultural graduates by referring to the Agricultural Research, Education and Extension Organization, consulting the experts at that organization, and selecting the field's employers as the statistical population. Table 5 shows the employment sectors of agricultural graduates.

**Table 5***Employment Sectors of Agricultural Graduates and Relevant Organizations*

Employment sectors of agricultural graduates	Relevant organizations
Agricultural engineering technical and advisory service firms	Agricultural and Natural Resources Engineering Organization Agricultural centers organizing office and extension networks
Plant protection clinics	Plant Protection Organization
Soil science laboratories	Soil and water research institution
Insurance brokers	Agricultural insurance fund
Agricultural tools services companies	Agricultural Mechanization Development Center
Agricultural production cooperatives	Central organization for rural cooperatives
Constructive corps	Agricultural centers organizing office and extension networks

Sample employers were selected from the same provinces as the samples of learners and educators (Tehran, Razavi Khorasan, Kermanshah, Ilam, and Fars). Employers who were directly involved in graduates' entry into the labor market were selected purposefully (n=142). Most respondents were male (77.5 %), the average work experience was 17.34 years, and more than half had an MSc degree.

**Reliability and Validity of the Questionnaire**

We developed two questionnaires based on the characteristics of the pillars of the competency-based agricultural higher education system (Saadvandi et al., 2024). The first questionnaire was completed by learners and educators and was used to assess the internal pillars of the agricultural higher education system.

It included four sections: on the personal and professional characteristics of the respondents, characteristics of educators in a competency-based agricultural higher education system, characteristics of a competency-based agricultural curriculum, and characteristics of a competency-based agricultural learning environment. The second questionnaire was completed by employers from the agricultural sector and was used to assess the personal and professional characteristics of the employers and the competency-based characteristics of agricultural graduates.

**Validity of instruments:** Items on the questionnaire were extracted from English-language articles published in international journals. We then showed the tool to a group of professors and PhD students in the Education and Competence Studies Group at Wageningen University & Research and eliminated or changed some items based on their recommendations (face validity). The questionnaire was then translated into Farsi and given to several Iranian agricultural education and extension faculty members to confirm the validity.

**Reliability of instruments:** For the pilot test, 30 individuals were selected from each respondent group, specifically from a population not included in the main research population. This selection strategy was employed to enhance the instrument's validation across a broader demographic. The reliability of the instruments was assessed using Cronbach's alpha, yielding values of 0.85 for the educators' questionnaire, 0.83 for the learners' questionnaire, and 0.86 for the employers' questionnaire. These results indicate a high level of internal consistency and stability, confirming the instrument's reliability in accurately measuring the intended constructs. For more information on this, see Appendix I.

Data analysis was performed in SPSS version 22 using descriptive and inferential statistics. The collected data were analyzed using descriptive statistics, including mean, standard deviation (Std), coefficient of variation (CV), and ranking. Furthermore, comparative tests were conducted to examine the differences in opinions between educators and learners.

## Results

The following sections reflect the current situation in Iran's competency-based agricultural higher education system.

**The status of educators in the competency-based agricultural higher education system in Iran:** Both educators and learners ranked 'personal skills' highest on the list of educators' characteristics, followed by 'teaching and evaluation methods'. However, while learners ranked 'management skills' last, educators put 'communication skills' in last place (Table 6).

**Table 6**

*Ranking Characteristics of Educators in Competency-Based Agricultural Higher Education*

Learners' viewpoint				Characteristic	Educators' viewpoint			
Rank	CV	Std	Mean		Mean	Std	CV	Rank
1	0.371	1.07	2.91	Personal skills	3.56	2.91	0.259	1
2	0.384	1.06	2.79	Teaching and evaluation methods	3.40	0.93	0.277	2
3	0.388	1.08	2.82	Communication skills	3.28	0.99	0.307	6
4	0.391	1.09	2.81	Scientific ability	3.44	0.95	0.280	3
5	0.398	1.07	2.72	Professional skills	3.42	1.05	0.306	5
6	0.419	1.13	2.73	Management skills	3.42	0.98	0.288	4

### The status of curriculum in the competency-based agricultural higher education system in Iran:

The educators ranked ‘improving analytical skills’ first on the list of curriculum characteristics, while learners chose ‘improving personal skills.’ However, both groups ranked ‘improving technical skills’ last.

**Table 7**

#### *Ranking Curriculum Characteristics in Competency-Based Agricultural Higher Education*

Learners' viewpoint				Characteristic	Educators' viewpoint			
Rank	CV	Std	Mean		Mean	Std	CV	Rank
1	0.412	1.07	2.60	Improving personal skills	2.82	1.05	0.378	3
2	0.412	1.02	2.49	Improving analytical skills	2.87	1.04	0.364	1
3	0.422	1.07	2.53	Improving management skills	2.83	1.07	0.380	4
4	0.428	1.09	2.57	Comprehensiveness	1.86	1.07	0.376	2
5	0.437	1.07	2.46	Improving technical skills	2.80	1.10	0.397	5

### The status of learning environment in the competency-based agricultural higher education system in Iran:

Learners and educators ranked the characteristics of the learning environment similarly, putting ‘improving technical skills’ first, ‘improving communication skills’ second, and ‘improving personal development’ third.

**Table 8**

#### *Ranking Characteristics of the Learning Environment in Competency-Based Agricultural Higher Education*

Learners' viewpoint				Characteristic	Educators' viewpoint			
Rank	CV	Std	Mean		Mean	Std	CV	Rank
1	0.418	1.05	2.51	Improving technical skills	3.09	1.00	0.324	1
2	0.423	1.08	2.57	Improving communication skills	3.10	1.01	.0330	2
3	0.423	1.06	2.52	Improving personal development	3.04	1.05	0.346	3

**Comparison of educators' and learners' viewpoints:** A comparison of educators' and learners' viewpoints regarding a competency-based agricultural higher education system in Iran showed significant differences in all the studied educational pillars. Based on the mean comparison test (t-test), educators assigned a higher mean to all educational pillars.

**Table 9**

*Comparison of Educators and Learners' Viewpoints Regarding Competency-Based Agricultural Higher Education*

Variable	Group	N	Mean	Std	t	P value
Status of the educators	Learners	384	264.99	61.98	-13.68	0.001
	Educators	302	325.87	52.10		
Status of the curriculum	Learners	384	152.53	43.41	-5.53	0.001
	Educators	302	171.59	45.79		
Status of the learning environment	Learners	384	76.12	22.16	-9.44	0.001
	Educators	302	92.35	22.49		

### **The status of learners in the competency-based agricultural higher education system in Iran:**

Employers ranked 'communication domain' as the strongest characteristic of Iranian agricultural graduates, while they ranked 'personal domain' last (Table 10).

**Table 10**

*Ranking Characteristics of Learners in Competency-Based Agricultural Higher Education*

Dimension	Mean	Std	CV	Rank
Communication domain	3.16	0.84	0.267	1
Analytical domain	2.89	0.84	.0292	2
Technical domain	2.84	0.87	0.310	3
Management domain	2.82	0.87	0.310	4
Personal domain	2.91	0.96	0.335	5

**Overall status of a competency-based agricultural higher education system in Iran:** Generally, the ranking of educational pillars in the Iranian agricultural higher education system indicated that the mean score for educators is higher than the mean score for the other pillars (mean=3.10, Std=0.136). The mean score for learners is 2.92 (Std=1.19), and the mean scores for the learning environment and curriculum are 2.80 (Std=1.04) and 2.68 (Std=1.06), respectively.

### **Discussion**

This study aimed to assess the agricultural higher education system in Iran through a competency-based approach. The results indicate that learners and educators exhibited the highest mean scores in terms of competency-based characteristics, suggesting a strong alignment with the principles of competency-based education (CBE). This highlights the effectiveness of current teaching methods and the preparedness of students and educators to engage in CBE. However, the mean scores for the learning environment and curriculum were lower, indicating gaps in institutional support and curricular design. These findings align with previous research that emphasizes the need for a holistic approach to CBE, which includes competent educators, motivated learners, a supportive learning environment, and a well-designed curriculum.

A comparison of students' and educators' viewpoints regarding the characteristics of educators, the curriculum, and the learning environment showed significant differences. The mean for characteristics in all pillars evaluated by educators was higher than the mean based on student evaluations. Results obtained by Biemans et al. (2009) and Saadvandi et al. (2024) show that educators and learners have significantly different viewpoints regarding CBE. This difference might be due to educators having a more comprehensive understanding and experience of CBE, so that some of its characteristics may be more tangible to them. The mean assessed characteristics demonstrate that Iran's current agricultural higher education system is far from an ideal CBE system. Getting closer to a favorable condition would require that the principles of competency-based training govern all components of this system.

Our research evaluated the current status of various components separately and determined the strengths and weaknesses of each. For instance, the curriculum pays less attention to technical and managerial skills, which is in line with the results obtained by Movahedi (2017) and Aghapour et al. (2014). Technical skills are specialties that learners need to have to succeed in the labor market, while managerial skills include the ability to work with others and use resources optimally; abilities which, based on the results, are overlooked in the curriculum. In general, the evaluation of the items used to assess curriculum characteristics demonstrates that the current curriculum has been developed without considering the complexities of the professional world. There is no proper connection between agricultural programs and the needs of the labor market, and the content taught is mainly limited to theoretical knowledge and controlled conditions of the university and ignores operational and practical skills required to work in natural conditions. Hence, it fails to prepare students for work success and dealing with future professional issues.

Results related to evaluating the learning environment revealed that more attention is paid to promoting technical skills, which is in line with earlier results (Deegan et al., 2016; Pant, 2012). According to this study's definition, improving technical skills in the learning environment means providing the necessary conditions and facilities to learn the practical dimension of agriculture. In contrast, the assessment of the curriculum revealed that the emphasis on technical skills was ranked lowest among the evaluated characteristics. This indicates that the current curriculum framework places less importance on the development of practical technical skills. Such a discrepancy highlights a critical gap between the learning environment and the curriculum, suggesting a need for curriculum reform to better integrate technical skill development. Addressing this gap is essential for aligning educational outcomes with industry requirements and ensuring that graduates possess the practical skills necessary for effective performance in the agricultural sector. Agricultural graduates had unfavorable technical skills, with a mean of 2.84 out of 5, which led to its ranking as third among five characteristics. This is to be expected, considering the current learning environment and curriculum. Alibaygi and Pouya (2011) confirmed the low technical skills of agricultural graduates in Iran.

Another characteristic of agricultural graduates was the low mean score for managerial and personal skills. The former involves the ability to work with others and optimally use resources, while the latter is about working in complicated situations, understanding the concept of professional competence, and creating a desire for lifelong learning. The low level of such skills among agricultural graduates may be due to weak communication between the labor market and the agricultural higher education system, which has been confirmed previously (Mulder, 2017).

According to CBE principles, graduates should be able to work in a complex environment, understand the need to work with others, and want to continue learning after graduation. However, this requires learners to investigate the professional environment during their education and to understand its issues and problems, so that they acquire the knowledge and skills needed to succeed in the agricultural profession. Moreover, observing the complexities of the professional learning environment helps students to understand that an academic degree may provide entrance to the labor market, but that professional

success will require them to continue learning throughout their careers. However, studies have shown that agricultural higher education in Iran is presented in an environment different from the authentic situation (Movahedi, 2017), and this difference teaches students to work in a controlled university environment and to develop knowledge and skills that are not commensurate with the needs of the agricultural labor market. This contradiction limits the share of agricultural jobs held by agricultural graduates and means that many jobs in the sector are filled by uneducated people or people with an unrelated education.

The ranking of educators in Iran's agricultural higher education system was highest for 'personal skills' and 'teaching and evaluation methods', based on the opinions of educators and students. However, 'communication skills' and 'managerial skills' were ranked lowest. This indicates that, while educators are effective within the university, they struggle with external communication and management, in conflict with competency-based principles. To address these weaknesses, it is recommended to organize professional development workshops focused on enhancing communication skills and to encourage participation in collaborative projects with industry partners. Establishing mentorship programs and providing managerial training tailored to the agricultural sector can also help. Regular feedback mechanisms from students, peers, and external stakeholders will further support improvement. By implementing these recommendations, educators can enhance their skills, aligning them more closely with CBE principles and improving their effectiveness both inside and outside the university.

### **Conclusion**

Our study reveals that, despite the emphasis on communication with society and the labor market in CBE, Iran's agricultural higher education system struggles in this area. The curriculum and learning environment overly focus on academic education, neglecting professional work implications. Educators are more adept within the educational system and less capable of engaging with the community and the labor market, resulting in graduates being ill-prepared for the agricultural workforce.

To transition to a CBE system, Iran's agricultural education system must undergo significant changes. While Mulder (2017) suggests starting with defining vocational core problems and revising the curriculum, this approach may not suffice in Iran due to the less educated agricultural workforce. Instead, establishing a connection between the education system and the labor market should be the initial step, enabling curriculum revisions based on labor market needs.

After evaluating the curriculum based on the viewpoints of educators and learners, it is clear that the learning environment needs to become more aligned with the labor market. To enhance the learning environment, we recommend that a portion of the education be conducted directly at agricultural institutions and work centers equipped with the necessary facilities. Currently, this practical education is offered through minimal internship credits (two credits), which is insufficient for providing meaningful practical experience (Korani et al., 2021). Improving the quality and scope of these internships can significantly enhance skill development and career readiness for students. Furthermore, inviting successful entrepreneurs from the agricultural sector to share their experiences and insights can greatly enrich the learning process. These entrepreneurs can offer practical knowledge, mentorship, and real-world problem-solving skills that are crucial for students. By integrating entrepreneurial perspectives into the curriculum, we can better prepare students for the dynamic challenges of the agricultural industry.

In addition to changing the curriculum and learning environment, educators must justify these changes by addressing external challenges and outlining their tasks and plans. This includes enhancing communication with the university's external environment and the labor market. For instance, holding in-service training courses and implementing reward systems for educators who improve their engagement with the world outside the university can significantly enhance the competence of Iran's agricultural higher

education system. By focusing on these external interactions, the education system can better align with competency-based education and address the broader issues that it faces.

Like any scientific research, this study has its limitations. One major limitation was the lack of a coherent database of private agricultural employers, forcing reliance on public sector employers' opinions. Given the differences between private and public sectors, future research should include private employers' viewpoints for a more comprehensive assessment. Another limitation was potential biases in educators' opinions about the curriculum, learning environment, and themselves. As custodians of the learning environment, their views might influence the results. To mitigate this, we also considered students' opinions.

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Appendix I: Characteristics, items, and Cronbach's alpha

Pillar	Characteristic	Definition	Sample item	Item	$\alpha$	
					Educator	Learner
Educator	Teaching and evaluation method	Using a set of principles and methods to empower learners in the learning process	Uses appropriate teaching methods. Gives synthesized principles and theory. Gets students engaged in teaching and learning.	32	0.94	0.95
	Communication skills	Having the ability to communicate with others and teach it to learners	Develops relationships with fellow teachers and administrators. Coordinates with local agricultural organizations and activities.	9	0.81	0.73
	Professional skills	Having skills to improve the quality of teaching	Is knowledgeable about university policies. Has knowledge of academic requirements.	20	0.93	0.88
	Personal skills	Having a suitable personality to play the role of a mentor and being a suitable model for improving the individual skills of learners	Is trustworthy and sincere. Can solve problems and multi-task.	17	0.89	0.92
	Scientific ability	Having sufficient mastery in a specialized field and a wide range of information	Has field-specific theoretical knowledge. Gives new information, not only what is in the book.	9	0.82	0.89
Curriculum	Improving technical skills	Covering skills that are used in the professional environment and related to graduates' expertise	Acquires off-campus occupational experience. Encourages students to secure funding for profitable experience.	16	0.95	0.94
	Comprehensiveness	Considering the aspects of knowledge and skills necessary for success in a professional position and creating a comprehensive thinking system	Integrates ideas from agricultural as well as social science disciplines. Creates curriculum suitable to the forces of the work field (who articulate the societal demands for graduate attributes – demand-driven).	12	0.90	0.89

	Improving personal skills	Covering activities to enhance career and citizenship competencies	Decision-making capabilities. Able to accept responsibility.	16	0.96	0.93
	Improving management skills	Covering activities to improve the ability to work with and for others and improve resource management skills	Collaborates with others. Conflict and dispute management.	8	0.95	0.86
	Improving analytical skills	Covering a variety of activities to enhance analytical ability and linking educational materials with previous experience and knowledge	Greater emphasis on developing problem solving. Encourages students to use their interpretations of experience to challenge and critique classroom theory.	5	0.94	0.89
Learning environment	Improving technical skills	Providing the conditions, facilities, and favorable atmosphere to realize the practical activities in the learning process	Considers contexts and resources to put knowledge into practice. Learners see tangible results of their work.	10	0.91	0.91
	Improving personal development	Providing a platform to consider learners' values, interests, and ideas to improve their personal development	Environments to generate new ideas for actions. Requires students to integrate ideas from agricultural as well as social science disciplines.	11	0.95	0.91
	Improving communicational skills	Providing opportunities for learners to communicate with others either in the educational system or in the labor market	Easy interaction between student and facilitator (teacher). Interactive learning with discussion.	9	0.88	0.92
Pillar Graduate	Characteristic Personal domain	Definition Having skills to improve professional and citizenship performance	Sample item Has developed correct behavior.	Item 17	<b><math>\alpha</math></b>	
					<b>Employer</b> 0.95	
	Technical domain	Having the required skills to perform specialized tasks in a professional position	Has technical knowledge. Able to follow directions.	16	0.81	
	Analytical domain	Able to analyze and apply previous experiences and learnings in a professional position	Able to solve problems on the job. Interpret data and make correct inferences.	13	0.73	

	Communication domain	Having a set of skills that enable graduates to communicate with others in a professional environment	Able to work in multicultural workplace. Listening skills.	12	0.93
	Management domain	Able to work with and for others and to manage different resources	Able to manage teamwork. Financial management and budgeting skills.	11	0.90