# Higher Agricultural Education: An Exploratory Study on Skill Gap of Students


## ABSTRACT

The skill gap among higher education students has become a pressing concern in today's competitive job market, prompting the need for thorough assessment and targeted interventions. This study endeavours to quantify the extent of skill discrepancies among students in higher agricultural education. Through skill gap analysis, the aim is to gauge the shortfall in agricultural and professional competencies among young scholars, delineating the areas where skills are lacking or underdeveloped. By employing an exploratory research design, the study seeks to identify and address skill gaps effectively. The target respondents comprise students from IARI, University of Agricultural Sciences (Raichur), and Banda University of Agriculture and Technology, with a sample size of 150 selected to represent the population adequately. To construct the skill gap index, various dimensions including technical, personal, problem-solving, leadership, entrepreneurial, computer, and organizational skills were pretested. Data collection involved the utilization of questionnaires and in-person interviews to evaluate competency differences among students across the three agricultural universities. Statistical methods such as the Friedman test and the Wilcoxon signed rank test was employed to analyse the gathered data. The analysis found significant disparities in the overall skill levels of students. These findings underscore the need for targeted interventions to bridge the identified skill gaps effectively. By illuminating areas of deficiency, this study provides valuable insights for enhancing the quality of agricultural education and fostering the development of well-rounded professionals equipped to tackle the challenges of the agricultural sector.



**Keywords:** Skill gap, Problem-solving skills, Personal skills, Higher Agriculture Education, Friedman test, Wilcoxon signed rank test.


## INTRODUCTION

Students pursuing higher education in agriculture are always concerned about how their education relates to the development of the desired skills and employability, as well as how having these talents and the confidence to use them would increase their motivation. As we know due to increases in the number of students and a decrease in job opportunities competency emerged

among the students which creates unemployment. This unemployment showed a devastating effect on the student's future and the economy of the nation. In the present scenario for employment opportunities, qualities rather than quantity are more crucial than demand at any given time. Although there is a greater demand for graduates in the agriculture industry than in other industries, businesses are looking for graduates across the board. Instead, they want the agricultural graduates to possess a variety of additional skills, such as those related to technical, communication, problem-solving, and presentation, as well as practical knowledge and exposure to the most recent technologies. If there is a gap in skills among the students that plays an important role in employment opportunities and their future. Even though higher agricultural education in India produces thousands of graduates as an output every year. Still, the graduates are not getting into the profession due to a lack of skills; this is due to less focus on soft skills and more on hard skills in higher agricultural education in India. According to (Blackie *et al.* 2009) the skills and competencies of graduates do not match today's agricultural sector needs because expectations, attitudes, and employment in the agriculture sector have changed. Agriculture is modernizing, (Paisley 2012), and newer skills are required to address new challenges. (Hamburg *et al*. 2013) studied in line with many of the findings, that characteristics such as professional expertise, interpersonal skills, work experience, innovativeness, organizational skills, international orientation, and general academic skills were perceived to be mandatory by employers. The study reported by (Tanaka and Sithole 2015) on a rapidly developing and highly competitive job market, the student should be well-trained in word processing, communication, and software skills. (Kumar *et al*. 2014) reported the course curriculum should emphasize self-study, group studies, and assignments in addition to personality development skills and communication skills. They should also give skills through practical training experiences that foster entrepreneurship. Without improving the graduates' personality development skills, it is impossible to build professional human resources in the modern 21st century. When compared to graduates of other professional degrees like engineering, medicine, etc., agricultural graduates' presentation, communication, and computer abilities are comparatively of lesser quality. Because they are unable to compete with those with professional degrees in the labour market, agriculture graduates end themselves unemployed (Rao *et al.* 2011). So, examining the gaps between the qualities of skill-set expected by the employers and that available to the graduates would help in bridging the gap. In this context,

the present study throws some light on the mismatch between the requirements of the employers and the level of skills that the graduates possess.

## MATERIALS AND METHODS

In the present research study, an exploratory research design has been used to identify the respondents. The data was gathered from the three agriculture universities/institutes. The Selection of the universities was based on the ICAR ranking list of agricultural universities 2021, further, we categorized 67 ranking agricultural universities into three levels - upper level, middle level, and lower level. We selected the Indian Agricultural Research Institute, (IARI, New Delhi), the University of Agriculture Sciences, Raichur (UASR), and Banda University of Agriculture and Technology, Banda (BUAT) universities and institutes among the three levels with simple random sampling. A total population of 150 postgraduate students was selected using simple random selection. In the second stage, a total population of 150 postgraduate students and 50 students from each university was selected using simple random selection.

***Skill gap:*** A skill gap has been operationally defined as what has not been done or the abilities that students lacked and were behind in skills like technical skills, personal skills, problem-solving skills, leadership skills, entrepreneurship skills, computer skills, and organizational skills enables us to determine how far behind the young scholars were in terms of agricultural and professional skills. The influence of the skill gap of higher agriculture students was measured by an index that was developed for this specific purpose. The criteria for selection should serve as a reference for whether or not to include an indicator in the overall composite index. It should describe the events being monitored as precisely as possible, including input, process, and output. The dimensions in this Index were discovered by a review of existing literature and the expert's opinion, and the indicators were selected under each dimension after being tested for relevance with thirty experts. Table 1 shows that twenty-seven items were selected for final measurements out of thirty-two items after the pre-test was done with scores given by the judges. The mean relevancy score for each statement was calculated and the statements with a mean relevancy score greater than 3.5 were included in the interview schedule. The student's career choice index under seven indicators viz, Technical skills, Personal skills, problem-solving skills, leadership skills, entrepreneurial skills, computer skills, and organizational skills consisting of 4, 5, 4, 4 3, 3, and 4 respectively.

$$\text{Mean relevancy score} = \frac{(\text{most relevant}*5) + (\text{relevant}*4) + (\text{neutral}*3) + (\text{irrelevant}*2) + (\text{most irrelevant}*1)}{\text{Number of judges}}$$

***Weightage:*** The influence of socio-demographic variables is operationalized to the extent that meets the desired results of career choice. The dimensions and indicators were sent to experts of the concerned field for relevancy test and to provide weightage for each dimension. The mean weight was calculated and used for final measurements.

$$\textbf{Skill Gap Index} = \frac{D1\times W1 + D2\times W2 + D3\times W3 + D4\times W4 + D5\times W5 + D46\times W6 + D7\times W7}{W1+W2+W3+W4+W5+W6+W7} \times 100$$

where,

D1 = Score obtained on Technical skill

D2= Score obtained on Personal skill

D3 = Score obtained on Problem-solving skill

D4 = Score obtained on Leadership skill

D5= Score obtained on Entrepreneurship skill

D6= Score obtained on Computer skill

D7= Score obtained on Organizational skill

Each respondent's index value was calculated and cumulative cube root frequency was used to categorize the respondents into three strata for a better comprehensive picture of the career choices including low, medium, and high which shows influence. For the final measurements, we used the Friedman test to find the significance of the overall skill gap and for each indicator. Friedman test is a non-parametric test and an alternative to two-way analysis of variance which is used when the same parameter has been measured under different conditions on the same subjects. Friedman test only could tell the statistical significance between the groups of universities, but it could not specifically explain which two groups are statistically significant. To find out significant differences between the particular groups, we employed the Wilcoxon signed rank test, a non-parametric test that was performed, considering all possible pairs of universities. Table 1 revealed that the weightage for each dimension and the mean relevancy score of indicators were obtained as per scores given by the judges.

**Table 1: Weightage given by judges and Mean value of each indicator**

| SL. No | Dimensions | Weightage given by judges | Indicators | Mean value of each indicator |
|---|---|---|---|---|
| 1. | Technical skills | 4.33 | I am technically proficient in handling mechanical (laboratory, field instruments) equipment. | 3.72 |

| | | | | |
|---|---|---|---|---|
| 2. | | | I am good at writing, graphics designs, etc. | 4.27 |
| 3. | | | I am good at research techniques. | 4.02 |
| 4. | | | I am good at presentation skills. | 4.23 |
| 5. | Personal skills | 3.77 | I can learn new skills. | 3.60 |
| 6. | | | I can communicate with others. | 4.45 |
| 7. | | | I am good at creative thinking. | 3.97 |
| 8. | | | I can self-motivate. | 3.69 |
| 9. | | | I am good at understanding empathy (the psychology of other people). | 3.65 |
| 10. | Problem-solving skills | 3.97 | I am good at handling tough situations | 3.85 |
| 11. | | | I can formulate decisions quickly and effectively. | 3.82 |
| 12. | | | I can make the right decision | 4.1 |
| 13. | | | I am good at finding the best solution to the problem | 4.12 |
| 14. | Leadership skills | 3.89 | I can connect and collaborate with a group. | 4.07 |
| 15. | | | I can lead groups. | 4.15 |
| 16. | | | I know how to motivate others. | 3.47 |
| 17. | | | I am good at building a team. | 3.67 |
| 18. | Entrepreneurship skills | 3.35 | I am good at creating innovative ideas. | 3.62 |
| 19. | | | I am very good at strategic thinking. | 3.7 |
| 20. | | | I am good at business management skills. | 4.15 |
| 21. | Computer skills | 3.27 | I can communicate easily through mobile phones and computer appliances. | 4.2 |
| 22. | | | I can operate any digital technology | 4.02 |
| 23. | | | I am good at computer courses like basics, languages, Tallies, etc. | 3.77 |
| 24. | Organizational skills | 4.1 | I am good at organizing any work | 4.07 |
| 25. | | | I am good at time management. | 3.8 |
| 26. | | | I can coordinate and monitor events. | 4.1 |
| 27. | | | I know how to execute the plan. | 4.3 |



## RESULTS AND DISCUSSION

The results showed that each index value has been calculated and categorised with the help of the cumulative cube root frequency method.

Table 2 shows that the overall technical skill gap among the total students of higher agriculture education results in 40 percent of total students having a high skill gap, 34 percent of total students having a low skill gap, and 26 percent of total students having a medium skill gap. The results also explained 66 percent of BUAT, Banda university students showed a comparatively higher skill gap than IARI and UAS, Raichur with 22 percent and 32 percent, respectively. In the medium skill gap range only 18 percent of the students of BUAT, Banda belonged to this category compared to 30 percent of medium range skill gap of both IARI and UAS, Raichur. In the IARI 48 percent of students belonged to la ow skill gap which was higher than 38 percent of UAS, Raichur, and BUAT, Banda.

**Table 2: Distribution of students according to their overall technical skills gap of students (N=150)**

| Technical skills gap | IARI **(N=50)** | | UASR **(N=50)** | | BUAT **(N=50)** | | Total (overall skill gap) **(N=150)** | |
|---|---|---|---|---|---|---|---|---|
| Category | ***f*** | ***%*** | ***f*** | ***%*** | ***f*** | ***%*** | ***f*** | ***%*** |
| Low (<19) | 24 | 48 | 19 | 38 | 8 | 16 | 51 | 34 |
| Medium (19-38) | 15 | 30 | 15 | 30 | 9 | 18 | 39 | 26 |
| High (>39) | 11 | 22 | 16 | 32 | 33 | 66 | 60 | 40 |
| Total | 50 | 100 | 50 | 100 | 50 | 100 | 150 | 100 |

Table 3 shows that the overall personal skill gap among the total students of higher agriculture education results in 44.66 percent of total students having a medium skill gap, 31.33 percent of total students having a low skill gap, and 24 percent of total students having a high skill gap. The results also explain that 36 percent of IARI university students showed comparatively lower skill gaps than BUAT, Banda, and UAS, Raichur with 32 percent and 26 percent, respectively. In the medium skill gap range only 52 percent of the students of UAS, Raichur belonged to this category compared to 38 percent and 44 percent of medium range skill gap of both BUAT, Banda, and IARI. In the BUAT, Banda 30 percent of students belonged to a high skill gap which was higher than 22 percent and 20 percent of UAS, Raichur, and IARI, respectively.

**Table 3: Distribution of students according to their overall personal skills gap of students (N=150)**

| Personal skills gap | IARI **(N=50)** | | UASR **(N=50)** | | BUAT **(N=50)** | | Total (overall skill gap) **(N=150)** | |
|---|---|---|---|---|---|---|---|---|
| Category | ***f*** | ***%*** | ***f*** | ***%*** | ***f*** | ***%*** | ***f*** | ***%*** |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Low (<20) | 18 | 36 | 13 | 26 | 16 | 32 | 47 | 31.33 |
| Medium (20-40) | 22 | 44 | 26 | 52 | 19 | 38 | 67 | 44.66 |
| High (>40) | 10 | 20 | 11 | 22 | 15 | 30 | 36 | 24 |
| Total | 50 | 100 | 50 | 100 | 50 | 100 | 150 | 100 |

Table 4 shows that the overall problem-solving skill gap among the total students of higher agriculture education results in 43.33 percent of total students having a medium skill gap, 37.33 percent of total students having a high skill gap, and 19.33 percent of total students having a low skill gap. The results also explain the low skills category 22 percent of both IARI and UAS, Raichur University students showed comparatively more than BUAT, Banda with 14 percent. The students of BUAT, Banda, and IARI both with 44 percent and 42 percent of UAS, Raichur belonged to the medium range skill gap category. In the BUAT, Banda 42 percent of students belonged to a high skill gap which was higher than 34 percent and 36 percent of IARI and UAS, Raichur, respectively.

**Table 4: Distribution of students according to their overall problem-solving skills gap of students (N=150)**

| Problem-solving skill gap | IARI **(N=50)** | | UASR **(N=50)** | | BUAT **(N=50)** | | Total (overall skill gap) **(N=150)** | |
|---|---|---|---|---|---|---|---|---|
| Category | ***f*** | ***%*** | ***f*** | ***%*** | ***f*** | ***%*** | ***f*** | ***%*** |
| Low (<30) | 11 | 22 | 11 | 22 | 7 | 14 | 29 | 19.33 |
| Medium (30-48) | 22 | 44 | 21 | 42 | 22 | 44 | 65 | 43.33 |
| High (>48) | 17 | 34 | 18 | 36 | 21 | 42 | 56 | 37.33 |
| Total | 50 | 100 | 50 | 100 | 50 | 100 | 150 | 100 |

Table 5 shows that the overall leadership skill gap among the total students of higher agriculture education results in 42 percent of total students having a high skill gap, 41.33 percent of total students having a medium skill gap, and 16.66 percent of total students having a low skill gap. The results also explain that 22 percent of IARI university students showed a comparatively low skill gap than students belonging to BUAT, Banda, and UAS, Raichur with 14 percent each. In the medium skill gap range only 40 percent of the students of UAS, Raichur, and 42 percent of both BUAT, Banda, and IARI students belonged to the medium range skill gap. In the high skill gap category 36 percent of IARI, 46 percent of UAS, Raichur, and 44 percent of BUAT, Banda students belonged to this category.

**Table 5: Distribution of students according to their overall leadership skills gap of students (N=150)**

| Leadership skill gap | IARI **(N=50)** | | UASR **(N=50)** | | BUAT **(N=50)** | | Total (overall skill gap) **(N=150)** | |
|---|---|---|---|---|---|---|---|---|
| Category | ***f*** | ***%*** | ***f*** | ***%*** | ***f*** | ***%*** | ***f*** | ***%*** |
| Low (<18) | 11 | 22 | 7 | 14 | 7 | 14 | 25 | 16.66 |
| Medium (18-36) | 21 | 42 | 20 | 40 | 21 | 42 | 62 | 41.33 |
| High (>36) | 18 | 36 | 23 | 46 | 22 | 44 | 63 | 42 |
| Total | 50 | 100 | 50 | 100 | 50 | 100 | 150 | 100 |

Table 6 shows that the overall entrepreneurial skill gap among the total students of higher agriculture education results in 58.66 percent of total students having a high skill gap, 30 percent of total students having a medium skill gap, and 11.33 percent of total students having a low skill gap. The results also explain the low skills category surprisingly 48 percent of IARI students showed comparatively lower than 64 percent of UAS, Raichur University, and 66 percent of BUAT, Banda students had a high skill gap. The 16 percent of students of IARI showed comparatively more than 8 percent of both UAS and BUAT, Banda students had low skill gaps. 36 percent of IARI students showed higher than 28 percent and 26 percent of students of UAS, Raichur BUAT, Banda belonged to the medium range skill gap.

**Table 6: Distribution of students according to their overall entrepreneurial skills gap of students (N=150)**

| Entrepreneurial skill gap | IARI **(N=50)** | | UASR **(N=50)** | | BUAT **(N=50)** | | Total (overall skill gap) **(N=150)** | |
|---|---|---|---|---|---|---|---|---|
| Category | ***f*** | ***%*** | ***f*** | ***%*** | ***f*** | ***%*** | ***f*** | ***%*** |
| Low (<12) | 8 | 16 | 4 | 8 | 4 | 8 | 17 | 11.33 |
| Medium (12-46) | 18 | 36 | 14 | 28 | 13 | 26 | 45 | 30 |
| High (>46) | 24 | 48 | 32 | 64 | 33 | 66 | 88 | 58.66 |
| Total | 50 | 100 | 50 | 100 | 50 | 100 | 150 | 100 |

Table 7 shows that the overall computer skill gap among the total students of higher agriculture education results in 63.33 percent of total students having a high skill gap, 26 percent of total students having a medium skill gap, and 10.33 percent of total students having a low skill gap. The results also explain the low skills category surprisingly 70 percent of UAS, and Raichur students showed comparatively higher than 66 percent of BUAT, Banda University and 54 percent of IARI students showed a high skill gap. The 34 percent of students of IARI showed

comparatively more than 22 percent of UAS, Raichur, and BUAT, Banda students with medium range skill gap. The 12 percent of IARI and BUAT, Banda students showed higher than 8 percent of students of UAS, Raichur belonged to the low range skill gap.

**Table 7: Distribution of students according to their overall computer skills gap of students (N=150)**

| Computer skills gap | IARI **(N=50)** | | UASR **(N=50)** | | BUAT **(N=50)** | | Total (overall skill gap) **(N=150)** | |
|---|---|---|---|---|---|---|---|---|
| Category | ***f*** | ***%*** | ***f*** | ***%*** | ***f*** | ***%*** | ***f*** | ***%*** |
| Low (<23) | 6 | 12 | 4 | 8 | 6 | 12 | 16 | 10.66 |
| Medium (23-53) | 17 | 34 | 11 | 22 | 11 | 22 | 39 | 26 |
| High (>53) | 27 | 54 | 35 | 70 | 33 | 66 | 95 | 63.33 |
| Total | 50 | 100 | 50 | 100 | 50 | 100 | 150 | 100 |

Table 8 showed that the overall organizational skill gap among the total students of higher agriculture education results in 50 percent of total students having a high skill gap, 34.66 percent of total students having a medium skill gap, and 15.33 percent of total students having a medium skill gap. The results also explain the low skills category surprisingly 60 percent of BUAT, Banda students showed a comparatively higher skill gap than 54 percent of UAS, Raichur University, and 36 percent of IARI. The 40 percent students of IARI showed comparatively more than 34 percent of UAS, Raichur, and 30 percent of BUAT, Banda students with medium range skill gap. 24 percent of IARI students showed higher than 12 percent and 10 percent of students of UAS, Raichur, and BUAT, Banda belonged to the low range skill gap.

**Table 8: Distribution of students according to their overall organizational skills gap of students (N=150)**

| Organization skills gap | IARI **(N=50)** | | UASR **(N=50)** | | BUAT **(N=50)** | | Total (overall skill gap) **(N=150)** | |
|---|---|---|---|---|---|---|---|---|
| Category | ***f*** | ***%*** | ***f*** | ***%*** | ***f*** | ***%*** | ***f*** | ***%*** |
| Low (<12) | 12 | 24 | 6 | 12 | 5 | 10 | 23 | 15.33 |
| Medium (12-56) | 20 | 40 | 17 | 34 | 15 | 30 | 52 | 34.66 |
| High (>12) | 18 | 36 | 27 | 54 | 30 | 60 | 75 | 50 |
| Total | 50 | 100 | 50 | 100 | 50 | 100 | 150 | 100 |

**Test significance for skill gap index:**

For overall skill gap analysis, the Friedman test for analysis of variance statistical tool was used for skill gap index measurement. The index consists of seven indicators that act as dependent variables for the overall skill gap. Table 9 reflected the value of the test statistics i.e., Wilks' ʌ value (0.000), with F (111, 1286.663[b]). It indicated that students of different universities for the overall skill gap were significantly different from each other at a 1 percent level of significance. This showed that there was a significant difference between the overall skill gaps of IARI, UAS, Raichur, and BUAT, Banda students.

**Table 9: Multivariate tests for the overall skill gap of students of different agriculture universities**

| | | | | | | |
|---|---|---|---|---|---|---|
| **Overall skill gaps** | **Effect** | **Value** | **F** | **Df** | **Error df** | **Sig.** |
| | Wilks' Lambda | .000 | 1286.663[b] | 111 | 38 | <.001** |
| | Pillai's Trace | 1.000 | 1286.663[b] | 111 | 38 | <.001** |

Table 10 reflects that the p-value <.001 and mean ranks of each skill showed significance for the overall skill gap at a 1 percent level of significance.

**Table 10: Tests of between-subjects effect for overall skill gap of students of different agriculture universities**

| | **Dependent Variable** | **df** | **Error df** | **Mean Square** | **F** | **Sig.** |
|---|---|---|---|---|---|---|
| **Overall skill gap** | Technical skills | 111 | 38 | 336.305 | 3895.884 | <.001** |
| | Personal skills | 111 | 38 | 320.44 | | |
| | Problem-solving skills | 111 | 38 | 286.172 | | |
| | Leadership skills | 111 | 38 | 468.969 | | |
| | Entrepreneur skills | 111 | 38 | 528.830 | | |
| | Computer skills | 111 | 38 | 1701.970 | | |
| | Organizational skills | 111 | 38 | 951.021 | | |

** significance level at 1 percent

Table 11 reflects the significance of each indicator of the skill gap index among the students of IARI, UAS, Raichur, and BUAT, Banda. Results showed that among the seven indicators, six indicators viz. personal skills, problem-solving skills, leadership skills, entrepreneurship skills, computer skills, and organizational skills showed significance at a 1 percent level of significance

and only technical skills showed significance at a 5 percent level of significance. The Friedman test showed the difference between the skill gaps of the three universities by comparing mean ranks between universities and indicators of the skill gaps index. To obtain the significant difference between the universities, the Wilcoxon signed-rank test was performed for each indicator of the skill gap index.

**Table 11: Friedman test for each indicator of skill gaps of students of different agriculture universities**

| Sl.no | INDICATORS | Universities | Mean rank | N | Chi-square | df | Sig |
|---|---|---|---|---|---|---|---|
| 1 | Technical skills | IARI | 1.74 | 50 | 11.346 | 2 | .003* |
| | | UAS | 2.03 | | | | |
| | | BUAT | 2.23 | | | | |
| 2 | Personal skills | IARI | 1.48 | 50 | 86.600 | 2 | <.001** |
| | | UAS | 1.56 | | | | |
| | | BUAT | 2.96 | | | | |
| 3 | Problem-solving skills | IARI | 1.18 | 50 | 63.034 | 2 | <.001** |
| | | UAS | 2.62 | | | | |
| | | BUAT | 2.20 | | | | |
| 4 | Leadership skills | IARI | 1.18 | 50 | 81.911 | 2 | <.001** |
| | | UAS | 2.62 | | | | |
| | | BUAT | 2.20 | | | | |
| 5 | Entrepreneurship skills | IARI | 1.00 | 50 | 85.888 | 2 | <.001** |
| | | UAS | 2.38 | | | | |
| | | BUAT | 2.62 | | | | |
| 6 | Computer skills | IARI | 1.00 | 50 | 91.000 | 2 | <.001** |
| | | UAS | 2.10 | | | | |
| | | BUAT | 2.90 | | | | |
| 7 | Organizational skills | IARI | 1.72 | 50 | 79.840 | 2 | <.001** |
| | | UAS | 1.28 | | | | |
| | | BUAT | 3.00 | | | | |

** significance level at 1 percent * significance level at 5 percent

Table 12 reflected that the technical skill gap among IARI-UAS, Raichur showed significance at a 5 percent level of significance, and between IARI-BUAT, Banda, and UAS, Raichur-BUAT, Banda showed significance at a 1 percent level of significance which showed there was a significant difference in the technical skill of students of each university. Under personal skills between UAS, Raichur-IARI showed non-significant whereas, IARI-BUAT, Banda and UAS, Raichur-BUAT, Banda showed significant difference at a 1 percent level of significance, which showed that these two comparisons of university students showed the difference in the personal skills. Under problem-solving skills, IARI-UAS, Raichur, and IARI-BUAT showed there was a significant difference in the problem-solving skills at a 1 percent level of significance, and UAS, Raichur-BUAT, Banda showed a significant difference at 5 percent level of significance. Under leadership skills, each university student showed a significant difference at a 1 percent level of significance which showed there was a significant difference in leadership skills among the students belonging to three universities. Under entrepreneurship skills UAS, Raichur-BUAT, Banda showed non-significant and IARI-UAS, Raichur, and IARI-BUAT showed there was a significant difference among the students at a 1 percent level of significance. Under computer skills, students of all three universities showed a significant difference at a 1 percent level of significance. Under organizational skills among IARI-UAS, Raichur showed non-significant. Whereas, IARI-BUAT, Banda and UAS, Raichur-BUAT, Banda showed significantly a 1 percent level of significance which showed a significant difference in the organizational skill of students of each university.

The analysis of personal skills revealed the significance of traits such as critical thinking, problem-solving, adaptability, and communication skills in preparing agriculture graduates for a rapidly evolving industry. Several research papers (Smith *et al.* 2018; Brown and Johnson 2020) have emphasized the need to incorporate these skills within the curriculum through interactive learning methods, internships, and industry collaborations. According to (Jabeen 2011) studied the mismatch between graduating university students' perceptions and employers' expectations regarding employability skills. Research by (Jackson and Martin 2020) underscored the value of integrating experiential learning and internships to develop students' organizational capabilities and enhance their ability to work in interdisciplinary teams. Organizational skills, such as project management and teamwork, are fundamental in the agriculture sector, where collaboration and efficient resource allocation are critical (Mason *et al.* 2019). (Moore and Morton 2017) studied and identifying a particular set of communication skills to promote workplace readiness is

challenging. The policy that encourages non-graduate technical and non-technical diploma/certificate holders into lower graduate-intensity occupations would help to close the skill gap and reduce the pressure on graduate higher education (Unni 2016). However, studies suggest that educational institutions often overlook the development of these skills, leading to graduates who struggle with effective coordination and management within agricultural enterprises. Entrepreneurial skills are essential for individuals seeking to establish their agricultural ventures or contribute to the growth of existing ones (Rathore *et al.* 2017). According to (Mpho M. Pheko and KaeloMolefhe 2017), addresses that college students might be aware of basic skills of employability but they may not be aware of critical skills that are essential to enter the labour market. Nevertheless, research has indicated that entrepreneurship education in agriculture is often limited, leaving graduates without the necessary knowledge and mindset to drive innovation and create sustainable agricultural businesses. Technical skills, including data analysis, precision agriculture, and sustainable farming techniques, are vital for modern agricultural practices (Sharma *et al.* 2020). Nonetheless, research indicates that higher education programs often lag in incorporating these emerging technologies and practices into their curricula, leaving graduates ill-prepared to meet industry demands. (Kaur and Anand 2020) reported that managerial competency was identified to be the most needed among agricultural graduates as perceived by the students followed by entrepreneurial, extension skills, technical, market/understanding of government policy, communication ICT, and personal competency. Galagan P. 2010. Reported One side states that the modern-day skills requirements are outpacing the education system i.e., schools and universities are not preparing the workforce to meet new job requirements. (Rodge and Gupta 2020) studied that due to highly dynamic market changes, requires compulsory changes in the skill set of fresh graduates for business.

**Table 12: Wilcoxon signed rank test for each indicator of skill gap difference between the two groups**

| **Sl. No** | **Indicators** | | **UAS – IARI** | **BUAT – IARI** | **BUAT-UAS** |
|---|---|---|---|---|---|
| 1 | Technical skills gap | Z | -2.841[b] | -3.759[b] | -2.814[b] |
| | | Sig(2-tailed) | .005* | <.001** | .005* |
| 2 | Personal skills gaps | Z | -1.893[b] | -6.145[b] | -6.123[b] |
| | | Sig(2-tailed) | .058 | <.001** | <.001** |
| 3 | | Z | -5.698[b] | -3.761[b] | -2.164[c] |

| | | | | | |
|---|---|---|---|---|---|
| | Problem-solving skills gaps | Sig(2-tailed) | <.001** | <.001** | .030* |
| 4 | Leadership skill gaps | Z | -3.342[b] | -6.156[b] | -6.074[b] |
| | | Sig(2-tailed) | <.001** | <.001** | <.001** |
| 5 | Entrepreneurship skills gaps | Z | -6.165[b] | -6.172[b] | -1.690[b] |
| | | Sig(2-tailed) | <.001** | <.001** | .091 |
| 6 | Computer skills gaps | Z | -6.168[b] | -6.166[b] | -5.354[b] |
| | | Sig(2-tailed) | <.001** | <.001** | <.001** |
| 7 | Organizational skill gaps | Z | -1.701[b] | -6.161[c] | -6.160[c] |
| | | Sig(2-tailed) | .089 | <.001** | <.001** |

** significance level at 1 percent * significance level at 5 percent

## CONCLUSION

In conclusion, this study investigated the skill gap among students from three different agriculture universities in the context of higher agriculture education. The skill gap index was utilized to measure the significant differences in skill levels among the students. The multivariate test analysis revealed a statistically significant distinction among students from different universities in terms of their overall skill gaps, indicating variations in the skill levels of students from IARI, UAS Raichur, and BUAT Banda. The Friedman test was conducted to compare the mean ranks and skill gap index indicators among the three universities, highlighting the existence of significant differences. However, the Friedman test alone could not determine the specific pairs of universities with significant differences. Therefore, the Wilcoxon signed-rank test was employed to analyse all possible pairs of universities. The results demonstrated significant differences in all pairs, except for UAS Raichur - IARI in personal skills gaps, UAS Raichur - BUAT Banda in entrepreneurial skills, and UAS Raichur - IARI in organizational skills gaps, where non-significant differences were observed. So, examining the gaps between the qualities of skill-set expected by the employers and that available to the graduates would help in bridging the gap.

Disclaimer (Artificial intelligence)

Option 1:

Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc) and text-to-image generators have been used during writing or editing of this manuscript.

Option 2:

Author(s) hereby declare that generative AI technologies such as Large Language Models, etc have been used during writing or editing of manuscripts. This explanation will include the name, version, model, and source of the generative AI technology and as well as all input prompts provided to the generative AI technology

Details of the AI usage are given below:

1.

2.

3.



## REFERENCES


1. Blackie M, Mutema M and Ward A. 2009. Factors determining a demand for agricultural graduates in the SADC and ASARECA region: For SCARDA and RUFORUM. *RUFORUM*, Kampala, Uganda.

2. Paisley C. 2012. Skill gaps in formal higher agricultural education: A youth perspective. *Background paper for the Future Agricultures Conference on Young People, Farming and Food*. Future of the Agrifood Sector in Africa.

3. Hamburg M, Rolf V and Annelore. 2013. The employability of higher education graduates, Maastricht University.*European Union*: p. 146.

4. Tanaka S And Sithole M. 2015. Information technology knowledge and skills accounting graduates need. *International Journal of Business and Social Science* 6(8): 47–52.

5. Kumar A, De D and Kumar T S. 2014. Quality education for quality production in agriculture. *AGRICULTURE UPDATE 9*(4): 578–583.

6. Rao D R, Rashmi Agrawal and Nanda S K. 2011. Assessment of Future Human Capital Requirements in Agriculture and Allied Sectors. *NAIP Project Report*, NAARM, Hyderabad, India. p 410

7. Smith J, Brown C and Simmons R. 2018. The importance of non-technical skills in agricultural education. *Journal of Agricultural Education* 59(1): 168-185.

8. Jackson A and Martin J. 2020. Preparing graduates for employment: The case for experiential learning in agricultural degrees. *Journal of Agricultural Education* 61(2): 108-124.

9. Mason D, Nuthall P and Lambie K. 2019. Development of entrepreneurial skills in agriculture: An integrated framework. *Journal of Agricultural Education and Extension* 25(3): 273-289.

10. Unni J. 2016. Skill gaps and employability: Higher education in India. *Journal of Development Policy and Practice 1*(1): 18–34.

11. Rathore V S, Pandey A and Singh A. 2017. Entrepreneurial skills development in agricultural education: An Indian perspective. *Journal of Agricultural Education and Extension* 23(3): 263-279.

12. Pheko M M and Molefhe K. 2017. Addressing employability challenges: A framework for improving the employability of graduates in Botswana. *International Journal of Adolescence and Youth 22*(4): 455–469.

13. Sharma V P, Arora R, Singh P and Garg S. 2020. Bridging the gap between technical skills and agriculture graduates in India. *Indian Journal of Agricultural Sciences* 90(3): 546-551.

14. Kaur M and Anand A. 2020. Gap analysis of higher agricultural education competencies among the students for industrial and farmers' needs. *Asian Journal of Agricultural Extension, Economics and Sociology* 3(8):75–83.

15. Rodge and Gupta. 2020. A study on the employability skill gap of entry level professionals: An industry perspective. *palarch's journal of archaeology of Egypt/Egyptology* 17(12): p. 1567. *ISNN, 214x*.

16. Moore, T., & Morton, J. (2017). The myth of job readiness?Written communication, employability, and the 'skills gap' in higher education. *Studies in Higher Education,* 42(3):591–609.

17. Jabeen T. 2011. An appraisal of mismatch between graduating students' perception and employers' expectations regarding employability skills *[Thesis]*. University of Gujrat.

18. Galagan, P. (2010) Bridging the Skills Gap: Part II. Association for Talent Development. Retrieved from: https://www.td.org/Publications/Magazines/The-Public-Manager/Archives/2010/04/Bridging-the-Skills-Gap-Part-II.