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# Assessing the Competency Level of Graduate Students: A Gender Perspective

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## ABSTRACT

*This study assesses competency levels among graduate students in agriculture, horticulture, and forestry disciplines in various states of India from a gender perspective. A total of 402 student respondents participated, with 215 responders through a Google forms survey and 187 from training programs organized by the National Institute of Agricultural Extension Management (MANAGE), Hyderabad. Competency was evaluated across four key constructs: cognitive, interpersonal, self-leadership, and digital, using a 13-group competency framework. Results indicated that while students demonstrated strengths in areas like self-leadership and interpersonal skills, significant gaps were found in digital competencies and certain cognitive skills. Gender-based analysis using the Mann-Whitney Test revealed that male students outperformed female students in critical thinking, mental flexibility, entrepreneurship, goal achievement, and digital skills. However, no significant gender differences were observed in planning, communication, teamwork, or self-awareness. The findings underscore the need for targeted educational interventions to bridge these competency gaps and enhance employability among graduates in the agricultural sector.*

**Keywords:** Competency Assessment, Agricultural Graduates, Gender Gap, Digital Skills, Employability

## Introduction

Improving the quality of higher education remains a global priority, particularly in developing countries, as the competencies gained during academic studies play a decisive role in students' employability (Smekalova, 2024). Challenges such as unemployment, existing alarming poverty, and labor market inequalities disproportionately impact youth and women, demanding urgent attention (ILO, 2019). These issues are linked to the United Nations Sustainable Development Goal 8 (SDG 8), which advocates for inclusive and sustainable economic growth, full employment, and decent work for all (UN, 2023). However, the International

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Labour Office continues to report significant deficits in decent work, especially among young people and women. The COVID-19 pandemic has exacerbated these challenges, leading to an unprecedented rise in the number of young people not engaged in employment, education, or training (ILO, 2022).

In the contemporary job market, particularly within the agricultural sector, it is imperative that students acquire a comprehensive set of competencies to enhance their employability and achieve successful career trajectories. Employers increasingly prioritize candidates who possess skills aligned with industry demands, highlighting the critical role of universities in facilitating the acquisition and development of these essential competencies. By integrating such opportunities within the academic framework, educational institutions not only strengthen the employability of graduates but also ensure their preparedness to navigate the dynamic job market.

### **Theoretical Framework**

The concept of competencies is multifaceted and challenging to define, with various interpretations existing in the literature. Competencies are broadly understood as the integration of experiences, knowledge, skills, values, and attitudes acquired over time. Woodruffe (1993) defines competencies as the behavioural patterns necessary to perform tasks effectively, while Klemp and McClelland (1986) emphasize their contextual nature. According to the OECD (2005), competency involves the ability to meet complex demands by mobilizing psychosocial resources in specific contexts.

The effectiveness of undergraduate programs is closely correlated with the employability of their graduates (Andelt et al., 1997). Scholars such as Higgins and Kram (2001) underscore the necessity of adaptable mentoring relationships to help students navigate the evolving career landscape. They identify key factors—such as employment contracts, technological advancements, organizational structures, and diversity—that influence career development. This necessitates that mentoring and career guidance in higher education remain responsive to current job market trends, ensuring that students are equipped not only with academic knowledge but also with the technical and soft skills essential for workforce success.

Addressing employability challenges requires a comprehensive approach, including curriculum revisions, alignment of course content with industry needs, provision of experiential learning opportunities, and implementation of effective mentoring programs. Universities must systematically design their programs to meet workforce demands (Knight & Yorke, 2003). Faculty members responsible for curriculum development should incorporate feedback from

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stakeholders-including students, researchers, practitioners, and the community-into program design and implementation (Hurst et al., 2015; Maiga et al., 2013). Regular evaluation of agricultural curricula, ideally every two to five years, is recommended to ensure that programs adequately prepare students for the workforce (Andelt et al., 1997; Morgan, 2010, 2012; Morgan & Rucker, 2013). Engaging with industry leaders to identify the competencies expected of entry-level employees allows educational institutions to align their curricula and program objectives with industry demands (Maiga et al., 2013; Morgan, 2010, 2012; Zubović et al., 2009).

Businesses increasingly expect college graduates to possess the competencies necessary for workforce success (Knight & Yorke, 2003; Sargent et al., 2003). Sleezer and Denny (2004) emphasize the critical role of human capital—particularly knowledge and innovation capacities—in the evolving economy. The decline in the availability of highly qualified workers underscores the need for college-educated individuals who can advance and apply new technologies. To address the shortage of skilled workers, the creation of a robust workforce development infrastructure is essential, with educational institutions playing a pivotal role in aligning educational resources with industry needs (Sleezer & Denny, 2004). Holzer (2012) further identifies a disconnect between the labour market and educational systems, contributing to the shortage of middle and highly skilled workers for well-paying jobs.

Morgan (2010) found that many competencies valued by employers in the agricultural sector, such as the ability to meet deadlines and reliability, are often indirectly taught through university structures rather than explicitly included in the curriculum. Sargent et al. (2003) evaluated a 15-week capstone course designed to develop leadership skills, concluding that leadership development should be integrated throughout the curriculum rather than concentrated in a single course. Hurst et al. (2015) conducted a comprehensive examination of factors contributing to the development of a productive agricultural workforce. Additionally, Easterly et al. (2017) emphasize the importance of personal and leadership competencies for leaders in agriculture and natural resources, highlighting the value of dependability, problem-solving, and critical thinking.

Handayani et al. (2019) stress the need for further research to integrate green skills alongside essential competencies to enhance the overall skill set of agricultural vocational students. Meanwhile, the increasing inclination toward entrepreneurship in agriculture, particularly in supportive environments, reflects a growing preference for establishing personal ventures over seeking traditional employment (Lesane and Akintunde, 2020).

Dondi et al. (2021) found that proficiency in certain digital and cognitive skill groups was below average among respondents. Additionally, Ghimire et al. (2022) identified significant differences between male and female faculty in their perceptions of the relevance of technical and employable skills, as well as in students' use of career guidance and mentoring to enhance their job prospects.

In this regard, it is important to examine the competence of students. Therefore, a study has been formulated to assess the competency levels of students at agricultural and allied universities in India from a gender perspective. This research aims to contribute to a deeper understanding of how these competencies are developed and perceived within this vital sector.

### **Methodology**

This study aimed to assess competency levels among graduate students in agriculture, horticulture, and forestry disciplines across various states in India. A survey research design was used for the study, with a total sample size of 402 students. Data collection was done through a Google Forms survey. Out of 402 respondents, 215 students responded through the Google Form, from students enrolled in different agricultural and forestry colleges, and 187 responses were obtained from students participated in training programs organized by the National Institute of Agricultural Extension Management (MANAGE), Hyderabad, India. The survey was conducted during November to December 2023.

To have a comprehensive understanding of competency, 13 distinct competency groups were selected based on review of relevant literatures. These groups were categorized under four key constructs: cognitive, interpersonal, self-leadership, and digital. Each competency group was assessed individually, with an index score for each category of competency to quantify proficiency levels.

Competence index = (Actual score / Maximum score) × 100

Following data collection and index score calculation, statistical analysis was conducted using SPSS to study gender-based differences in competency levels among the students. The Mann-Whitney Test was administered to evaluate significant differences in competency levels between male and female students, providing valuable insights into potential gender-related variations in competency level.

## Result

### Profile of the students

The study involved a sample of 402 students from agricultural and allied universities in India. Of these participants, 172 were male and 230 were female (Table 1) reflecting a balanced representation of both genders. The inclusion of a larger number of female participants also highlights the growing presence and importance of women in the agricultural field, enabling a detailed evaluation of gender-specific competencies and challenges.

**Table 1: Gender distribution of students**

Category	Numbers
Male	172
Female	230
<b>Total</b>	<b>402</b>

### Statement wise distribution of competency

Table 2 shows the competencies across four major constructs: Cognitive, Interpersonal, Self-Leadership, and Digital, with results indicating varying levels of proficiency among the participants.

In the cognitive construct, students displayed strong capabilities in decision-making (77.35%) and seeking relevant information (79.84%), yet struggled with logical reasoning, where 39.29% fell into the “Weak to Average” category. Similarly, while a majority showed competence in developing work plans (74.86%) and time management (71.14%), agile thinking remained a challenge for 38.30% of students. Communication skills were mixed, with active listening (80.83%) being a notable strength, but a significant portion of students exhibited weaker abilities in storytelling and public speaking (47.01%) and asking the right questions in different contexts (45.76%). Mental flexibility also varied, as most students excelled in learning from experiences (87.80%) and adapting to different perspectives (74.61%), though the ability to translate knowledge across contexts was underdeveloped for 36.06% of participants.

The interpersonal competencies revealed that while students had potential in understanding organizational dynamics (63.43%) and being role models (55.46%), their win-win negotiation skills were lacking for 43.77% of them. Developing relationships appeared to be a strength, with high levels of empathy (79.10%) and the ability to inspire trust (82.82%). Teamwork effectiveness was also robust, particularly in collaborating with team members (80.34%) and

fostering inclusiveness (75.12%). However, there was a noticeable need for improvement in resolving conflicts (28.10%) and empowering team members, where 50.99% of students fell short.

In the self-leadership construct, a substantial majority demonstrated strong self-awareness (88.55%) and an understanding of personal strengths (85.06%), yet areas like self-control and emotional regulation required further development, with 23.87% of students rated as “Weak to Average.” Entrepreneurial competencies were generally positive, with students showing a willingness to embrace challenges (73.38%) and innovation (73.87%), though many were cautious in risk-taking (70.14%) and breaking traditional norms (67.65%). When it came to achieving goals, students were highly driven, with 79.36% showing strong goal orientation. However, persistence (50.05% weak) and coping with uncertainty (31.83% weak) were identified as areas needing attention.

Finally, in the digital competencies, students excelled in digital collaboration (76.86%) and ethical digital practices (63.92%), but foundational digital literacy and citizenship were areas of concern, with nearly half rated as “Weak to Average.” Technical skills, particularly in programming and coding (76.35% weak) and data analysis (69.39% weak), were notably deficient. Additionally, students’ understanding of digital systems, including data management (62.18% weak) and cyber security literacy (64.92% weak), highlighted a critical gap in digital education.

Overall, while students demonstrated strengths in several key areas, significant gaps were identified, particularly in digital competencies and certain cognitive and interpersonal skills, underlining the need for targeted educational interventions.

**Table 2. Statement wise distribution of students competency**

Statements	Category	Percentage
	Good to Excellent	Weak to average
<b>Cognitive</b>		
<i>Critical thinking</i>		
Problem-solving	62.17	37.80
Logical reasoning	74.86	39.29
Decision-making	77.35	22.63
Seeking relevant information	79.84	20.14
<i>Planning and ways of working</i>		
Developing work plans	74.86	25.12
Time management and prioritization	71.14	28.85
Agile thinking in work	61.68	38.30

<b>Communication</b>		
Storytelling and public speaking	53.07	47.01
Right questions in different contexts	54.22	45.76
Synthesize messages effectively	64.67	35.31
Active listening	80.83	19.14
<b>Mental flexibility</b>		
Creative and imaginative in problem-solving	67.65	32.33
Adapt to different perspectives and contexts	74.61	25.34
Learn and grow from experiences	87.80	11.94
Translating knowledge to different contexts	63.92	36.06
Learn and adapt within a cognitive web	69.64	30.34
<b>Interpersonal</b>		
<b>Mobilising systems</b>		
Role model for others	55.46	43.28
Win-win negotiations	54.96	43.77
Crafting an inspiring vision	61.43	39.05
Understanding of organizational dynamics and awareness	63.43	37.06
<b>Developing Relationships</b>		
Empathy in my interactions with others	79.10	20.59
Inspire trust in others	82.82	17.16
Humility in interactions with others	70.64	29.34
Sociable and building positive relationships with different individuals	77.60	22.38
<b>Teamwork Effectiveness</b>		
Fostering inclusiveness within a team	75.12	24.87
Motivate individuals with different personalities	72.88	27.11
Resolving conflicts within a team	71.88	28.10
Collaborating with team members	80.34	19.64
Coaching and support to team members	72.87	25.81
Empowering individuals in a team	61.43	50.99
<b>Self-leadership</b>		
<b>Self-awareness and Self-Management</b>		
Understanding own emotions and triggers	88.55	11.41
Self-control and effective emotional regulation	74.86	23.87
Understanding of personal strengths and weaknesses	85.06	14.91
Integrity in all actions and decisions	75.11	24.61
Self-motivated and prioritize wellness in life	79.35	20.64
Self-confidence	76.35	23.55

<b>Entrepreneurship</b>		
Courage and willingness to take calculated risks	70.14	29.85
Change and innovation in various aspects of life	67.65	31.09
Approaching challenges with energy, passion, and a positive outlook	73.38	25.39
Open to break traditional norms and exploring new, unconventional ideas	73.87	24.86
<b>Goals Achievement</b>		
Ownership and make decisive decisions to achieve goals	79.34	20.64
Highly oriented towards achieving goals	79.36	19.44
Grit and persistence when working towards goals	72.62	50.05
Cope effectively with uncertainty in pursuing my goals	68.15	31.83
<b>Digital</b>		
<b>Digital fluency and citizenship</b>		
Digitally fluent and practice digital citizenship	56.95	43.02
Strong foundation in digital literacy	50.98	47.75
Digital learning and skill development	60.94	39.05
Collaborate in digital environments	76.86	23.13
Ethical standards in digital practices	63.92	36.06
<b>Software use and development</b>		
Programming and coding	23.38	76.35
Data analysis and statistics	30.59	69.39
Applying algorithms effectively	48.08	72.88
<b>Understanding digital system</b>		
Data literacy and data management	37.80	62.18
Smart systems and their applications	46.01	53.97
Cybersecurity literacy and online security practices	35.07	64.92
Translate and enable technology for different purposes	43.07	56.96

### Component wise competency of the students

Analysing the components within each construct, the cognitive domain displays varied competency levels. Mental flexibility stands out with the highest index value (0.75), followed by critical thinking (0.72), communication (0.70), and planning and ways of working (54.94%). Interpersonal skills exhibit proficiency, with developing relationships leading (77.86%), followed by teamwork and effectiveness (0.75) and mobilizing systems (67.69%). Self-leadership showcases

robust competency in self-awareness and self-management (79.20%), followed by goal achievement (0.74) and entrepreneurship (0.74). In the digital realm, digital fluency and citizenship display the highest index value (0.67), followed by understanding digital systems (0.59) and software use and development (0.37). (Table 3)

**Table 3. Component wise distribution of students competency**

Competency	Index
<b>Cognitive</b>	
Critical thinking	0.72
Planning and ways of working	0.54
Communication	0.70
<b>Mental flexibility</b>	0.75
Interpersonal	
Mobilising systems	0.67
Developing relationships	0.77
Teamwork effectiveness	0.75
<b>Self-leadership</b>	
Self-awareness and self-management	0.79
Entrepreneurship	0.73
Goal achievement	0.74
<b>Digital</b>	
Digital fluency and citizenship	0.67
Software use and development	0.37
Understanding digital system	0.59

### Construct wise competency of the students

Regarding the construct-wise competency of the students, self-leadership appears with the highest index value (0.75), followed closely by interpersonal skills (0.73) and cognitive skills (0.68), (Table 4)

**Table 4. Construct wise index**

Competency	Index
Cognitive	0.68
Interpersonal	0.73
Self-leadership	0.75
Digital	0.54

### Test of Normality

The test of normality suggests that the data is not normally distributed, (p value <0.05) necessitating the use of nonparametric tests.(Table 5).Using the Mann-Whitney test, a comparison of competency levels between male and female students reveals significant differences in seven components – critical thinking, mental flexibility, entrepreneurship, goal achievement, digital fluency and citizenship, software use and development, and understanding digital systems (P<0.01) with male students by demonstrating higher competence. On the other hand, competencies such as planning and ways of working, communication, developing relationships, teamwork and effectiveness, and self-awareness and self-management showed non-significant differences between male and female students. (P<0.01) (Table 6&7).

**Table 5. Test of normality**

Test of Normality		
Variables	Statistic	Sig.
Critical thinking	.111	<.001
Planning and ways of working	.124	<.001
Communication	.096	<.001
Mental flexibility	.096	<.001
Mobilising systems	.105	<.001
Developing relationships	.104	<.001
Teamwork effectiveness	.067	<.001
Self-awareness and self- management	.099	<.001
Entrepreneurship	.083	<.001
Goal achievement	.100	<.001
Digital fluency and citizenship	.079	<.001
Software use and development	.164	<.001
Understanding digital system	.106	<.001

**Table 6. Mann-Whitney Test**

Variables	Gender	N	Mean Rank
Critical thinking	Male	172	221.51
	Female	230	186.53
	Total	402	

Planning and ways of working	Male	172	209.59
	Female	230	195.45
	Total	402	
Communication	Male	172	206.64
	Female	230	197.66
	Total	402	
Mental flexibility	Male	172	193.41
	Female	230	212.31
	Total	402	
Mobilizing systems	Male	172	219.93
	Female	230	187.72
	Total	402	
Developing relationships	Male	172	207.12
	Female	230	197.30
	Total	402	
Teamwork effectiveness	Male	172	210.15
	Female	230	195.03
	Total	402	
self-awareness and self-management	Male	172	204.52
	Female	230	199.24
	Total	402	
Entrepreneurship	Male	172	224.11
	Female	230	184.59
	Total	402	
Goal achievement	Male	172	214.79
	Female	230	191.56
	Total	402	
Digital fluency and citizenship	Male	172	224.67
	Female	230	184.17
	Total	402	
Software use and development	Male	172	223.31
	Female	230	185.19
	Total	402	
Understanding digital system	Male	172	232.38
	Female	230	178.41
	Total	402	

**Table 7. Test statistics**

Test Statistics <sup>a</sup>													
	Critical thinking	Planning and ways of working	Communication	Mental flexibility	Mobilizing systems	Developing relationships	Teamwork effectiveness	self-awareness and self-management	Entrepreneurship	Goal achievement	Digital fluency and citizenship	Software use and development	Understanding digital system m
Mann-Whitney U	16337.500	18388.000	18896.500	17920.000	16610.000	18813.000	18293.000	19260.000	15890.500	17494.500	15794.000	16029.000	14469.500
Z	-3.017	-1.222	-.773	-1.623	-2.772	-.846	-1.295	-.453	-3.402	-1.999	-3.475	-3.298	-4.639
Asymp. Sig. (2-tailed)	.003	.222	.440	.002	.006	.398	.195	.650	<.001	.046	<.001	<.001	<.001

a. Grouping Variable: gender

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## Discussion

Students demonstrate a commendable level of competency across various constructs within the cognitive, interpersonal, self-leadership and digital domains.

In the cognitive domain, students exhibit proficiency in critical thinking, planning and ways of working, communication and mental flexibility. This proficiency may stem from the educational curriculum's focus on these skills and the adoption of teaching methodologies that promote active learning and problem-solving. Additionally, exposure to real-world scenarios and practical exercises likely enhances students' abilities to apply theoretical knowledge practically, fostering deeper understanding and critical thinking.

Within the interpersonal domain, students display strong communication skills, particularly in active listening and synthesizing messages effectively. This proficiency reflects the collaborative learning environment supported within the educational institution, where students engage in discussions, debates, and group activities to refine their communication abilities. Furthermore, assignments and projects emphasizing communication may provide ample practice opportunities.

In the self-leadership domain, students demonstrate resilience, adaptability, and problem-solving skills, indicative of a growth mind-set nurtured within the educational environment. Encouragement of embracing challenges, learning from failures, and self-directed learning initiatives likely contribute to students' development of essential self-leadership skills.

Regarding the digital domain, students exhibit proficiency in leveraging technology for learning and innovation. This proficiency may result from the integration of digital tools and platforms within the curriculum, alongside emphasis on digital literacy development. Resources such as online courses and educational apps facilitate students' engagement with digital technologies, preparing them for the digital-centric landscape.

## Cognitive Skills

The higher competency in mental flexibility suggests exposure to diverse learning environments, adaptability to change, and the ability to think creatively in dynamic situations. Enhanced critical thinking skills may result from rigorous academic training, problem-solving exercises, and exposure to analytical frameworks. Effective communication skills may stem from pedagogical methods emphasizing communication techniques, group discussions, and interactive learning sessions.

### **Interpersonal Skills**

The higher competency in developing relationships implies a strong emphasis on fostering interpersonal connections, possibly through team-building activities, peer-to-peer interactions, and mentorship programs. The equitable distribution of competency in teamwork and effectiveness may reflect collaborative learning environments, where students work together towards common goals.

### **Self-Leadership**

The emphasis on self-awareness and self-management could result from initiatives promoting self-reflection, personal development workshops, and psychological support services. Cultivated goal achievement skills might be a result of goal-setting exercises, mentorship programs, and extracurricular activities encouraging students to pursue their aspirations.

### **Digital Competency**

The higher competency in digital fluency and citizenship may stem from the integration of technology-enhanced learning methodologies, digital literacy initiatives, and exposure to digital citizenship concepts. Weaknesses in software use and development may be attributed to the complexity of technical subjects, limited practical exposure to programming languages, and the need for specialized training in software development. Challenges in understanding digital systems may arise from the rapid evolution of technology, gaps in curriculum alignment with industry demands, and the need for continuous updates in digital literacy education.

### **Gender Disparities**

Observed higher competency levels among male students in critical thinking, mental flexibility, entrepreneurship, goal achievement, digital fluency and citizenship, software use and development, and understanding digital systems could result from various factors:

**Socialization Patterns:** Traditional gender roles and societal expectations may influence skill development, with men historically encouraged to engage in problem-solving and technical fields.

**Educational Opportunities:** Male students may have had greater access to resources and opportunities promoting critical thinking, digital fluency, and software development.

**Cultural Norms:** Societal norms prioritizing technical proficiency and leadership qualities in men may influence skill development.

**Perceived Gender Stereotypes:** Stereotypes may affect self-perception and career

aspirations, with men more encouraged to pursue technical fields.

**Role Models and Mentorship:** Presence of male role models in leadership positions may inspire and mentor male students, contributing to skill development.

**Digital Divide:** Gender disparities in access to technology and digital resources may impact digital competency levels.

**Educational Pedagogy:** Teaching methods may favour the learning styles of male students, impacting skill acquisition.

Addressing gender disparities requires systemic efforts to promote inclusivity, challenge stereotypes, provide equal access to resources, and foster supportive learning environments.

## **Conclusion**

The current job market requires more than mere academic qualifications; employers seek candidates who possess a diverse skill set encompassing technical expertise, critical thinking, problem-solving abilities, effective communication and adaptability. In the agricultural sector, these competencies extend to proficiency in agricultural techniques, data analysis, sustainability practices, project management, and entrepreneurship.

As competition intensifies, students must acquire practical experiences, hands-on training, and industry-relevant knowledge to distinguish themselves. Universities play a pivotal role in facilitating such opportunities through internships, experiential learning programs, industry partnerships and tailored curriculum enhancements designed to meet evolving workforce demands.

Disparities in competency between male and female students may stem from societal norms, cultural biases, and differential resource access. Factors like confidence levels, socialization patterns, and gender stereotypes can impact skill acquisition and application. The varied competency levels across constructs underscore the multifaceted nature of skill development in agricultural extension education, emphasizing the need for customized pedagogical approaches, mentorship initiatives, and lifelong learning opportunities to address individual needs and bridge competency disparities.

By addressing gender inequalities and ensuring equitable access to resources and support, universities can empower all students to realize their potential and make meaningful contributions to the agricultural workforce.

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