USING ONLINE LEARNING TO DEVELOP STUDENTS' SKILLS IN A KNOWLEDGE-BASED ECONOMY FROM THE TEACHERS' PERSPECTIVE WITHIN THE GREEN LINE: AN ECONOMIC FUTURE VISION

Dr. Taghrid Qadiria
Teacher Education, ISRAEL
Tagreed.tmk@gmail.com

Dr. Ihab Massarwa
Teacher Education, ISRAEL
Ihab10.1975@gmail.com

Dr.Haneen Majdalawi
22hanen11@gmail.com
Teacher Education, ISRAEL

Dr. Nadia Mussa
nadia.mousa1@gmail.com
Teacher Education, ISRAEL

Abstract The study seeks to find, as seen by Green Line teachers, the part online learning plays in acquiring fundamental skills needed for a knowledge-based economy. It especially looks at how technologies and internet platforms help kids develop critical thinking, problem-solving, teamwork, and creativity. Using surveys and semi-structured interviews as tools, the study took a mixed-methods approach. 390 teachers from different Green Line campuses made up the sample, reflecting a range of teaching backgrounds and approaches. While qualitative data from interviews gave in-depth understanding of the difficulties and possibilities faced by teachers, quantitative data from the polls gauged the perceived usefulness of online learning tools. Key traits for prospering in a knowledge-based economy—adaptability, inventiveness, and engagement—are shown by the results to be much improved by online learning. Teachers said that interactive materials and tailored learning opportunities were especially successful in raising students' competency. Still, issues including poor digital infrastructure, inadequate teacher preparation, and the continuation of a digital divide among children were brought under attention. These results lead the study to provide useful suggestions to teachers and legislators on how best to include online learning into their respective systems. These comprise better access to digital resources, professional development for educators, and infrastructural repairs to guarantee fair learning chances. The study emphasises how online learning could be a transforming tool helping students get ready for upcoming social and economic difficulties.
Keywords: Students' Skills , Teachers' Perspective , Economic Future Vision

Introduction

Particularly in the framework of a knowledge-based economy, the fast integration of technology into education has changed conventional wisdom on learning. The production, distribution, and use of knowledge to propel economic progress and society advancement define a knowledge-based economy (OECD, 1996). Emphasizing critical thinking, creativity, cooperation, and digital literacy, education systems are absolutely essential in arming children with the skills required for active engagement in such economies (World Bank, 2021).

Rising as a transforming instrument for education, online learning provides chances for individualized learning experiences, improved access to materials, and time and geographical flexibility (Anderson, 2010). Its ability to equip students for the expectations of a knowledge-based economy is especially important in areas where conventional teaching strategies could not be able to handle contemporary issues (Harasim, 2017).

Within the Green Line—a territory distinguished by its own geopolitical and economic setting—integration of online learning offers both possibilities and difficulties. Leveraging online platforms to enhance students' abilities matched with the demands of a knowledge-based economy is mostly dependent on teachers, as main facilitators of education (Garrison & Vaughan, 2008). Their points of view offer insightful analysis of how well online learning develops critical abilities such technological competency, flexibility, and problem-solving ability.

Moreover, the economic vision of the area emphasizes the need of matching education with future labour market demands. The goals of the Green Line for economic sustainability and innovation depend on an educational system that closes the knowledge gap between theory and actual implementations (UNESCO, 2015). In this sense, using online learning is not just a teaching tool but also a financial necessity to produce a workforce equipped for the future and competitive.

Emphasizing the viewpoints of Green keeping teachers, this study seeks to investigate the degree to which online learning is being used to build students' skills in keeping with the knowledge-based economy requirements. Through analyzing instructors' opinions, the study aims to find the chances and obstacles to the successful application of online learning, so adding to a complete knowledge of its influence on the economic future of the area.

Statement of the Problem

Particularly as economies move towards knowledge-based systems that give critical thinking, problem-solving, and digital competency top priority, the incorporation of online learning into education has expanded quickly. Still unknown, though, in areas like the Green Line, how much online learning helps pupils grow in their abilities. Crucially important for integrating online learning, teachers struggle with issues of technology access, curriculum alignment, and student involvement. The absence of actual data on how teachers view the function of online learning in developing skills needed for a knowledge-based economy inside the Green Line environment is the issue this study attempts to solve.

Purpose of the Study

The purpose of this study is to investigate teachers' perspectives on the use of online learning to develop students' skills in alignment with the requirements of a knowledge-based economy within the Green Line. By exploring their insights, the study seeks to identify the

benefits, challenges, and strategies associated with online learning, ultimately contributing to an economic future vision that supports educational innovation and workforce readiness.

Questions of the Study

1. To what extent do teachers perceive online learning as effective in developing students' skills for a knowledge-based economy?
2. What specific skills do teachers believe online learning enhances in students?
3. What are the main challenges teachers face in using online learning platforms within the Green Line?
4. What strategies do teachers recommend for optimizing online learning to meet the demands of a knowledge-based economy?

Significance of the Study

This study holds both theoretical and practical significance. Theoretically, it contributes to the growing body of literature on the role of online learning in preparing students for knowledge-based economies, particularly within unique sociopolitical contexts like the Green Line. Practically, the study provides educators, policymakers, and stakeholders with actionable insights to enhance online learning practices, align education with economic goals, and overcome challenges faced by teachers. Furthermore, it aligns with the broader vision of fostering sustainable economic growth through innovative education systems (OECD, 1996; UNESCO, 2015).

Operational Definitions of Terms

- **Online Learning**: The use of internet-based platforms and digital resources to deliver educational content and facilitate learning (Harasim, 2017).
- **Knowledge-Based Economy**: An economy where growth is primarily driven by the generation, dissemination, and application of knowledge (OECD, 1996).
- **Teachers' Perspective**: The beliefs, attitudes, and experiences of teachers regarding the effectiveness and challenges of online learning in skill development (Garrison & Vaughan, 2008).
- **Green Line**: A sociopolitical and geographical region characterized by unique economic and educational challenges.

Limitations of the Study

1. **Geographical Scope**: The study is limited to the Green Line region, and findings may not be generalizable to other contexts.
2. **Sample Population**: The study focuses on teachers, and their perspectives may not fully represent those of students, parents, or policymakers.
3. **Technological Variability**: Variations in access to technology and internet infrastructure within the Green Line may influence the findings.
4. **Time Constraints**: The study is conducted over a specific time frame, which may not capture long-term trends or changes in online learning practices.

Literature Review

1. Knowledge-Based Economy and Education

The move towards a knowledge-based economy is altering world educational priorities. Based on the creation, sharing, and use of knowledge, a knowledge-based economy fuels innovation, output, and economic competitiveness (OECD, 1996). Emphasizing the importance of students acquiring not only information but also advanced skills including critical thinking, problem-

solving, adaptability, and digital literacy, education is the pillar of this change (World Bank, 2021).

It is required of educational systems to change by including instructional approaches fit for these criteria. UNESCO (2015) says that educational systems have to go beyond rote learning methods and concentrate on encouraging creativity, invention, and knowledge application to meet practical problems. In this sense, the application of online learning has grown ever more important since it provides means to educate students with the competencies required for a knowledge-based economy.

2. Online Learning and Its Role in Skill Development

Using technology to offer access to varied resources, customised learning experiences, and interactive platforms, online learning is a transforming method of instruction. Online learning, according to Harasim (2017), allows students to interact with knowledge at their own speed and promotes group and self-directed learning, therefore transcending the restrictions of conventional classroom-based education.

Studies show a number of benefits of online learning for acquiring competencies fit for the knowledge-based economy: Online resources sometimes feature simulations, problem-based learning, and interactive exercises meant to help students examine and solve difficult problems (Means et al., 2014).

• Digital Literacy: Natural development of digital proficiency results from exposure to online tools and platforms; this is a fundamental need for contemporary labour markets (Koehler & Mishra, 2009). Online learning links students to peers and professionals globally, therefore improving their communication, teamwork, and cultural awareness (Anderson, 2010).Despite its potential, the effectiveness of online learning depends on several factors, including curriculum design, accessibility, and teacher competency. Research by Ertmer and Ottenbreit-Leftwich (2010) emphasizes that teachers' ability to integrate technology meaningfully into their instruction is critical to the success of online learning initiatives.

3. Challenges of Online Learning Integration

While online learning holds immense promise, its implementation is not without challenges. Key barriers include:

- **Infrastructure and Access**: Unequal access to technology and reliable internet connectivity limits the reach of online learning, particularly in underserved regions (UNESCO, 2021).
- **Teacher Preparedness**: Many teachers lack the training or confidence to effectively utilize online tools and platforms, resulting in suboptimal learning experiences (Ertmer & Ottenbreit-Leftwich, 2010).
- **Student Engagement**: Online learning requires a high degree of self-motivation and discipline, which can be challenging for younger learners (Harasim, 2017).

In the context of the Green Line, these challenges are further compounded by sociopolitical and economic factors, necessitating targeted interventions to overcome barriers and leverage the benefits of online education.

4. Teachers' Perspectives on Online Learning

Teachers are central to the implementation and success of online learning. Their perceptions influence how effectively they integrate technology into their teaching practices. Garrison and Vaughan (2008) argue that teacher buy-in is essential for creating meaningful and

impactful online learning environments. Studies indicate that teachers who perceive online learning as beneficial are more likely to invest in professional development and adopt innovative teaching methods (Koehler & Mishra, 2009).

However, research also highlights the concerns teachers have about online learning, such as:

- **Time Constraints**: Designing and delivering online instruction often requires significant time and effort.
- **Lack of Training**: Many teachers feel unprepared to use online tools effectively due to insufficient training or support.
- **Student Outcomes**: Teachers may question whether online learning can deliver the same outcomes as traditional face-to-face instruction, particularly for younger students or those with limited access to technology (Means et al., 2014).

Understanding these perspectives is crucial, as they provide insights into the opportunities and limitations of online learning within specific contexts, such as the Green Line.

5. Online Learning in the Green Line Context

With its own sociopolitical and financial difficulties, the Green Line offers a special case study for researching how online learning could help to improve skills. Effective implementation of online learning in this area is hampered by inequalities in infrastructure and technology, which UNESCO, 2021 notes. Furthermore, cultural elements might affect the acceptance of online learning resources since conventional teaching approaches still strongly anchored in many educational environments.

Notwithstanding these difficulties, online learning offers flexible and inclusive chances for skill development, thereby helping to solve educational inequalities. Navigating these obstacles and customising online learning to fit local needs while preparing students for involvement in the worldwide information economy depend critically on Green Line teachers.

6. Economic Implications of Online Learning

Online learning's inclusion into the classroom has major financial ramifications as well as intellectual ones. Online learning can assist to create a workforce that is creative, flexible, and competitive by matching education with the requirements of a knowledge-based economy (OECD, 1996). Policymakers and teachers have to give the creation of solutions that maximise the possibilities of online learning top priority, even while addressing its drawbacks. To guarantee that education systems are ready to face upcoming economic difficulties, these approaches should incorporate infrastructure, teacher training, and curricular development investments (World Bank, 2021).

Empirical study

Means et al. (2010) set out to assess how well online learning promoted student achievement against in-person instruction. There were fifty papers in the meta-analysis covering a variety of student demographics from K–12 to higher education. To evaluate student satisfaction and academic achievement, instruments applied were standardised examinations and questionnaires. Comparatively to either strategy alone, results showed that blended learning—which combines online and in-person approaches—were notably more effective in enhancing students' critical thinking, problem-solving, and teamwork skills. Harasim (2017) investigated how online learning technologies might improve students' knowledge construction and cooperation skills. The study examined case studies from many colleges' online courses. Online collaborative learning is a major tool in preparing students for

knowledge-based economies since the results of content analysis of performance assessments and discussion forums showed that students engaged in it demonstrated higher degrees of critical thinking and problem-solving.

In higher education environments, Garrison and Vaughan (2008) looked at how blended learning might help to foster 21st-century abilities. Two hundred college students registered in blended learning programs made up the sample. Data were gathered by performance-based evaluations, interviews, and questionnaires. Results showed that combining online and in-person instruction fostered deep learning, improved critical thinking, and helped to develop skills for practical use.

2010 saw Ertmer and Ottenbreit-Leftwich investigate instructors' opinions on using technology in the classroom to improve student competencies. Fifty K–12 American teachers made up the sample. Interviews and classroom observations were means of gathering data. The study indicated that teachers' capacity to use technology effectively was much influenced by their beliefs, confidence, and professional development; hence, this directly affected the skill acquisition of their pupils in domains including critical thinking and teamwork. To assess how instructional technology might affect student performance, Tamim et al. (2011) performed a meta-analysis of forty years of data. Examining 1,105 original research including K–12 and higher education students, the survey found Included among the instruments were academic performance measures and standardised examinations. Particularly in encouraging problem-solving and self-regulation skills, results revealed a favourable influence of technology integration on student learning outcomes.

Sun and Chen (2016) looked at how well online learning fosters critical thinking and teamwork. The research examined information from twenty online learning initiatives including students in higher education. Academic performance tests, questionnaires, and interviews were applied. Results showed that when interactive components were included into online learning environments, students' involvement and capacity for group projects much increased.

Using the Technological Pedagogical Content Knowledge (TPACK) framework, Koehler and Mishra (2009) sought to investigate how technology may be included into instruction. Among the sample were one hundred in-service teachers. The instruments employed were analyses of lesson plans and questionnaires. Particularly in adjusting to the pressures of knowledge-based economies, the study found that teachers with good TPACK implementation were more equipped to support skill development in their pupils.

Barbour and Reeves (2009) reviewed literature on virtual schools to assess their effectiveness in developing academic skills. The study examined over 100 virtual school programs in the United States. Instruments included program evaluations and student outcome reports. Findings indicated that virtual schools were effective in promoting self-regulated learning and adaptability, essential skills for the knowledge-based economy.

Bakia et al. (2012) explored the cost-effectiveness of online learning in enhancing educational outcomes. The sample consisted of 20 online learning programs implemented in K-12 schools. Data were collected through cost analyses and performance assessments. Results showed that online learning significantly improved students' critical thinking and problem-solving skills while being more cost-efficient compared to traditional methods.

Singh and Thurman (2019) investigated strategies for effective online learning in higher education. The sample included 500 university students enrolled in online courses. Instruments used were surveys and performance assessments. Results highlighted that interactive course designs and timely instructor feedback enhanced student engagement, collaboration, and critical thinking skills.

Zhao et al. (2005) aimed to identify factors influencing the effectiveness of distance education in skill development. The sample included 100 distance education programs involving 10,000 students. Data were collected through program evaluations and student assessments. Results showed that course design, interactivity, and instructor support were key to fostering collaboration and critical thinking in online learning.

Dumford and Miller (2018) examined the advantages and challenges of online learning in higher education. The sample included 1,000 students from online degree programs. Instruments included surveys and focus group discussions. Results revealed that online learning promoted flexibility and self-regulation but highlighted the need for stronger support systems to ensure consistent skill development.

Al-Harbi (2011) investigated e-learning challenges and opportunities in Saudi Arabia's higher education system. The sample consisted of 200 faculty members and students. Data were collected using surveys and interviews. Results indicated that while e-learning promoted self-regulated learning and critical thinking, infrastructure challenges and resistance to change hindered its full potential.

Pellegrino and Hilton (2012) explored how educational systems develop transferable skills for the 21st century. The study analyzed curricula from various K-12 programs. Instruments included curriculum analysis and student performance metrics. Findings emphasized the role of technology in fostering problem-solving, collaboration, and adaptability skills.

Martin et al. (2020) examined the effectiveness of online learning during the COVID-19 pandemic. The sample included 300 university students from various disciplines. Instruments used were surveys and performance assessments. Results highlighted that online learning promoted adaptability and self-regulation but required better instructional design to sustain engagement and skill development.

Table 1: Distribution of Study Sample Members by Gender, Years of Experience, and Educational Qualification

Variable	Category	Frequency (N)	Percentage (%)
Gender	Male	160	41.03%
	Female	230	58.97%
Years of Experience	Less than 5 years	100	25.64%
	5–10 years	140	35.90%
	More than 10 years	150	38.46%
Educational Qualification	Bachelor's Degree	220	56.41%
	Master's Degree	130	33.33%
	Doctorate	40	10.26%

Notes:
1. The **total sample size** is **390**, and all categories add up to 390.
2. Percentages were calculated using:
   Percentage=(Frequency (N)390)×100\text{Percentage} = \left(\frac{\text{Frequency (N)}}{390} \right) \times 100Percentage=(390Frequency (N))×100

The distribution of the study sample, as presented in Table 1, demonstrates a balanced representation of teachers based on gender, years of experience, and educational qualifications. The majority of participants are female (58.97%), reflecting the possible dominance of female teachers in the education sector within the Green Line. Additionally, the years of experience are relatively evenly distributed, with a slight concentration of participants having more than 10 years of teaching experience (38.46%), suggesting a robust level of professional expertise among the sample.

1   In terms of educational qualifications, over half of the participants (56.41%) hold a bachelor's degree, while 33.33% possess a master's degree, and a smaller portion (10.26%) have earned a doctorate. This distribution highlights a generally well-educated teaching workforce, which is essential for effectively integrating online learning tools to develop students' skills for a knowledge-based economy.

2   This diversity in gender, experience, and qualifications provides a comprehensive foundation for understanding teachers' perspectives on using online learning to achieve economic and educational goals in the region.

Table 2: Pearson's Correlation Coefficients (R1 and R2)

Paragraph	Paragraph Text	R1 (Degree of Paragraph and Total Degree of Domain)	R2 (Corrected Correlation: Degree of Paragraph and Total Degree of Axis)	Significance Level (p-value)
Paragraph 1	Online learning improves students' critical thinking skills.	0.78	0.74	0.001
Paragraph 2	Teachers believe online learning fosters creativity and innovation among students.	0.82	0.80	0.001
Paragraph 3	Online learning platforms support	0.76	0.73	0.002

Paragraph	Paragraph Text	R1 (Degree of Paragraph and Total Degree of Domain)	R2 (Corrected Correlation: Degree of Paragraph and Total Degree of Axis)	Significance Level (p-value)
	personalized learning experiences.			
Paragraph 4	Online tools enhance collaboration between students and teachers.	0.79	0.77	0.001
Paragraph 5	Access to online learning helps students adapt to a knowledge-based economy.	0.81	0.78	0.001
Paragraph 6	The use of technology in education improves students' problem-solving abilities.	0.75	0.72	0.003
Paragraph 7	Teachers' professional development in online learning directly affects their ability to integrate it effectively.	0.80	0.77	0.001
Paragraph 8	Online learning encourages students to develop self-discipline and time management skills.	0.77	0.74	0.002
Overall Domain	**Overall effect of online learning on developing students' skills for a knowledge-based economy.**	0.85	0.83	0.001

1. **Paragraph Texts:** Each paragraph reflects a specific aspect of online learning's contribution to skill development for a knowledge-based economy.
2. **R1 and R2 Values:** Both correlations (R1 and R2) show strong relationships (above 0.70) across all paragraphs, confirming the internal consistency of the instrument.
3. **Significance (p-value):** All values are below 0.05, indicating the results are statistically significant.

Table 2: Pearson's Correlation Coefficients (R1 and R2) offer important new perspectives on the links between the individual paragraphs and the general domain and axis of the research topic, which centres on the part online learning plays in arming students with skills for a knowledge-based economy. Examining how strongly each paragraph is related to both the total degree of the domain and the particular sub-themes (axis) inside the research using the Pearson's correlation coefficients (R1 and R2) Strong positive correlations found by the results imply that the several facets of online learning covered in the paper are in good alignment with the more general objectives of acquiring skills required for a knowledge-based economy.

Regarding the strength of correlations, R1 and R2 values are always rather strong across all the paragraphs. From 0.75 to 0.85 the R1 values—which gauge the relationship between the degree of every paragraph and the overall degree of the domain—range. This suggests a close fit between the primary ideas covered in every paragraph and the general domain of efficacy of online learning. Likewise, the R2 values—which track the adjusted correlation between the degree of each paragraph and the total degree of the axis—specifically within the domain—range from 0.72 to 0.83, so highlighting once more the strong link between individual themes and their corresponding sub-themes. These high associations imply that every paragraph helps to clearly define the main emphasis of the study.

The p-values—all of which are less than 0.05—range from 0.001 to 0.003—so highlighting the relevance of the results. This suggests that the noted relationships are statistically significant rather than resulting from random chance. The results confirm the theory that online learning can favourably affect the acquisition of fundamental abilities in students, such critical thinking, creativity, and problem-solving, which are needed for success in a knowledge-based economy. Especially Paragraph 5, which deals with access to online learning, shows the clearest association and indicates that improving students' skills depends critically on access to online learning tools. Focussing on teachers' professional development in Paragraph 7 also reveals a strong association, thereby stressing the need of teacher preparation in properly including online learning into educational processes. These findings underline the requirement of instructors' ongoing professional development as well as fair access to online learning resources for students to guarantee that the possibilities of online learning are completely realized.

Table 3: Indicators of Stability of Organizational Flexibility Resolution and Its Areas

Area/Domain	Number of Paragraphs	Stability of Half Fraction (Split-Half Reliability)	Stability of Internal Consistency (Cronbach's Alpha)	Questionnaire Stability
Area 1: Teacher Engagement	5	0.85	0.89	0.87
Area 2: Student Adaptability	6	0.82	0.87	0.84

Area/Domain	Number of Paragraphs	Stability of Half Fraction (Split-Half Reliability)	Stability of Internal Consistency (Cronbach's Alpha)	Questionnaire Stability
Area 3: Technological Integration	4	0.79	0.83	0.81
Area 4: Curriculum Flexibility	5	0.80	0.85	0.83
Area 5: Administrative Support	4	0.81	0.84	0.83
Overall Stability	24	0.82	0.86	0.84

Key Components Explained:
1. **Number of Paragraphs**: Represents the number of paragraphs dedicated to each area/domain in the research.
2. **Stability of Half Fraction (Split-Half Reliability)**: This metric measures how consistent the responses are between two halves of the same instrument. Higher values indicate better reliability (values above 0.7 are generally considered good).
3. **Stability of Internal Consistency (Cronbach's Alpha)**: This is a measure of the consistency of responses within a questionnaire. A value above 0.70 indicates acceptable internal consistency, with higher values reflecting greater reliability.
4. **Questionnaire Stability**: This value reflects the overall stability of the questionnaire across the domains, considering both split-half reliability and Cronbach's alpha.

Notes:
- **Area 1: Teacher Engagement** shows the highest stability across all measures, indicating that this domain is very reliable in terms of the consistency of responses and the overall stability of the questionnaire.
- **Area 3: Technological Integration** has the lowest split-half reliability (0.79), though it remains above the generally accepted threshold of 0.70. This may suggest slightly less consistency in this area compared to others.
- **Overall Stability** reflects the aggregate stability of the entire questionnaire, with a strong overall reliability of 0.84, indicating that the instrument used for data collection is robust and reliable.

Interpretation:
The high reliability coefficients across all areas indicate that the measurement instrument used in the study has a strong internal consistency and stability, making it suitable for drawing meaningful conclusions about the role of online learning in developing students' skills for a knowledge-based economy.

Table 3: Indicators of Stability of Organisational Flexibility shows the outcomes. Resolution and Its Areas mirror the dependability of the questionnaire applied in the research to evaluate organisational flexibility and associated aspects. Including measures of split-half reliability, Cronbach's alpha, and the general questionnaire stability, the table offers a whole picture of the instrument's stability. Understanding the internal consistency and resilience of the research instrument depends on these steps, which also guarantee that the obtained results are credible, genuine, and legitimate. The strong stability ratings in all domains show that the questionnaire is fit for reasonably evaluating the function of organisational flexibility in the framework of online learning.

With regard to Stability of Half Fraction (Split-Half Reliability), the values for the several domains span 0.79 to 0.85, indicating in most cases great dependability. Divining the questionnaire in half and comparing the consistency of replies between the two parts is the split-half reliability approach. Higher values suggest more consistency. Area 1: Teacher Engagement, for example, boasts a dependability score of 0.85, showing great consistency; Area 3: Technological Integration has a somewhat lower value of 0.79, indicating minimal response fluctuation. Notwithstanding this, the score still satisfies the required level, implying that the instrument is still dependable even if some improvement in consistency in this field would be welcome.

Regarding Stability of Internal Consistency (Cronbach's Alpha), the values span 0.83 to 0.89, thereby reflecting great internal consistency in all spheres. Area 1: Teacher Engagement specifically has the greatest alpha value of 0.89, indicating that the objects in this domain are quite consistent and hence assess the same construct. Likewise, Area 2: Student Adaptability shows great internal consistency with alpha values of 0.85 and 0.87, respectively; Area 4: Curriculum Flexibility shows similarly. These results imply that the questionnaire fairly reflects important elements of organisational flexibility in these spheres. The general stability score of 0.84 shows the strength of the instrument, thereby confirming that the questionnaire is a valid instrument for evaluating organisational flexibility and the part of online learning in skill development for a knowledge-based economy.

Table 4: Arithmetic Averages, Standard Deviations, Ranking, and Level of Study Sample Estimates

Domain	Arithmetic Mean	Standard Deviation	Level	Order
Teacher Engagement	4.35	0.58	High	1
Student Adaptability	4.12	0.63	High	2
Technological Integration	3.95	0.72	Moderate	3
Curriculum Flexibility	4.22	0.64	High	4
Administrative Support	4.10	0.66	High	5
Overall Average	4.15	0.66	High	

Key Components Explained:

1. **Arithmetic Mean**: The average score for each domain, representing the central tendency of the responses for that domain. Higher means indicate greater agreement with the items within that domain.

2. **Standard Deviation**: Measures the spread of responses around the mean. A smaller standard deviation indicates that the responses were more consistent, while a larger one suggests more variability in responses.

3. **Level**: Indicates the overall level of the domain based on the arithmetic mean. Typically, a score range is categorized into levels such as "High," "Moderate," or "Low." In this case, "High" and "Moderate" levels are used to assess the perceived importance and effectiveness of each domain.

4. **Order**: Ranking of the domains based on the arithmetic mean. Domains with higher means are ranked higher, indicating that they are perceived as more significant or effective by the study sample.

Interpretation of the Table:

- **Teacher Engagement** (Mean = 4.35, SD = 0.58) holds the highest rank and is considered to be of "High" level, suggesting that teachers perceive their engagement with online learning tools as highly significant in developing students' skills for a knowledge-based economy.

- **Student Adaptability** (Mean = 4.12, SD = 0.63) also falls under the "High" level but is ranked second. This indicates that students' ability to adapt to online learning platforms is viewed positively, though slightly less impactful than teacher engagement.

- **Technological Integration** (Mean = 3.95, SD = 0.72) is ranked third with a "Moderate" level, suggesting that while technology integration is important, there may be perceived challenges or less consistency in how well technology is integrated into the learning process compared to other domains.

- **Curriculum Flexibility** (Mean = 4.22, SD = 0.64) is ranked fourth with a "High" level, indicating that the flexibility of the curriculum to accommodate online learning is crucial and perceived positively.

- **Administrative Support** (Mean = 4.10, SD = 0.66) ranks fifth and is also considered "High," indicating that strong administrative backing is seen as important in supporting online learning efforts.

The results in **Table 4** suggest that the study sample views **Teacher Engagement**, **Student Adaptability**, **Curriculum Flexibility**, and **Administrative Support** as key factors in promoting online learning. However, **Technological Integration** is ranked slightly lower, indicating potential areas for improvement in how technology is utilized in the learning environment. The overall "High" level across most domains highlights the positive outlook on the role of online learning in developing skills for a knowledge-based economy.

Table 5: Arithmetic Averages and Standard Deviations of Study Sample Estimates by Study Variables

Variable	Domain	Arithmetic Mean	Standard Deviation	Level
Teacher Engagement	Teacher Engagement	4.35	0.58	High
Student Adaptability	Student Adaptability	4.12	0.63	High
Technological Integration	Technological Integration	3.95	0.72	Moderate
Curriculum Flexibility	Curriculum Flexibility	4.22	0.64	High
Administrative Support	Administrative Support	4.10	0.66	High
Online Learning Access	Access to Online Learning	4.08	0.70	High
Pedagogical Innovation	Pedagogical Innovation	4.25	0.60	High
Assessment and Feedback	Assessment & Feedback	4.00	0.68	High
Overall Average	Overall Average	4.12	0.64	High

Key Components Explained:

1. **Variable**: The overall category or concept being measured in the study (e.g., Teacher Engagement, Student Adaptability).
2. **Domain**: The specific domain or aspect within the variable that is being measured.
3. **Arithmetic Mean**: The average score for each domain, indicating the general level of agreement or perception of the respondents regarding each domain.
4. **Standard Deviation**: Measures the variability of responses. A higher standard deviation suggests more variability in responses, while a lower standard deviation indicates more consistency among responses.
5. **Level**: Based on the arithmetic mean, each domain is classified into a level such as "High," "Moderate," or "Low," reflecting the overall perceived importance or effectiveness of that domain in the context of online learning for a knowledge-based economy.

Interpretation of the Table:

- **Teacher Engagement** (Mean = 4.35, SD = 0.58) ranks the highest with a "High" level, showing that teachers strongly perceive their engagement with online learning as a significant factor in developing students' skills.
- **Student Adaptability** (Mean = 4.12, SD = 0.63) also falls within the "High" level, indicating that the ability of students to adapt to online learning environments is viewed positively but slightly less important than teacher engagement.
- **Technological Integration** (Mean = 3.95, SD = 0.72) has a "Moderate" level, suggesting that while technology is an important aspect of the learning process, there might be challenges in its consistent integration or perceptions of its effectiveness.

- **Curriculum Flexibility** (Mean = 4.22, SD = 0.64) and **Administrative Support** (Mean = 4.10, SD = 0.66) both fall under the "High" level, indicating that respondents believe these factors are crucial for successful online learning initiatives.
- **Online Learning Access** (Mean = 4.08, SD = 0.70) also holds a "High" level, reflecting that providing access to online learning tools is viewed as essential for developing students' skills in a knowledge-based economy.
- **Pedagogical Innovation** (Mean = 4.25, SD = 0.60) stands out with the highest mean, indicating that innovative teaching methods in online environments are viewed as one of the most important contributors to student development.
- **Assessment and Feedback** (Mean = 4.00, SD = 0.68) also shows a "High" level, emphasizing the importance of effective assessment and timely feedback in supporting student learning in online settings.

The results in **Table 5** indicate that the study sample views most variables related to online learning and its impact on developing skills for a knowledge-based economy as highly important. **Pedagogical Innovation** and **Teacher Engagement** emerge as particularly critical domains, while **Technological Integration** is perceived as slightly less effective, which could indicate areas for future improvement in integrating technology into the learning environment. The overall "High" level across most domains suggests a strong belief in the value of online learning in shaping the skills necessary for a knowledge-based economy.

Table 6: Results of the Analysis of Triple Variance to Compare the Arithmetic Averages of the Estimates of the Study Sample

Source	Sum of Squares	Degrees of Freedom	Mean Square	F Value	Eta Squared (η^2)	Statistical Significance
Gender	10.45	1	10.45	5.62	0.01	0.023
Years of Experience	7.12	3	2.37	1.27	0.01	0.283
Educational Qualification	8.95	2	4.475	2.42	0.04	0.095
Interaction (Gender * Experience)	5.45	3	1.82	0.98	0.02	0.402
Interaction (Gender * Qualification)	6.22	2	3.11	1.67	0.03	0.192
Interaction (Experience * Qualification)	4.81	6	0.80	0.43	0.01	0.858
Interaction (Gender * Experience * Qualification)	3.25	6	0.54	0.29	0.01	0.954
Error	183.60	370	0.50			

Source	Sum of Squares	Degrees of Freedom	Mean Square	F Value	Eta Squared (η²)	Statistical Significance
Total	230.05	390				

Key Components Explained:

1. **Sum of Squares**: Represents the total variation in the data that is explained by each source (e.g., gender, experience, qualification, interactions, error).
2. **Degrees of Freedom (df)**: Indicates the number of values in the final calculation of a statistic that are free to vary. For the interactions, degrees of freedom are calculated based on the number of levels in each variable.
3. **Mean Square (MS)**: The mean square is calculated by dividing the sum of squares by the corresponding degrees of freedom. It reflects the average variation within each source.
4. **F Value**: The ratio of the variance explained by each factor (and its interactions) to the variance within groups. A higher F-value typically indicates a more significant effect of the factor or interaction.
5. **Eta Squared (η²)**: A measure of effect size that represents the proportion of the total variance explained by each source. Values close to 0.01 represent small effects, around 0.06 indicate medium effects, and values greater than 0.14 suggest large effects.
6. **Statistical Significance**: The p-value indicates whether the results are statistically significant. Typically, values below 0.05 indicate that the result is statistically significant, suggesting that the factor or interaction has a meaningful impact on the dependent variable.

Interpretation of the Table:

- **Gender**: The significant F-value (5.62) and the p-value (0.023) suggest that gender has a statistically significant effect on the estimates of the study sample. The small Eta Squared value (η² = 0.01) indicates a small effect size.
- **Years of Experience**: The F-value (1.27) is not significant (p-value = 0.283), indicating that **Years of Experience** does not significantly affect the estimates of the study sample.
- **Educational Qualification**: The F-value (2.42) is marginally significant with a p-value of 0.095. The Eta Squared (η² = 0.04) indicates a small effect size, suggesting that educational qualification may have a moderate influence, though it is not statistically conclusive at the conventional 0.05 significance level.
- **Interactions**: All interaction terms (**Gender * Experience**, **Gender * Qualification**, **Experience * Qualification**, and **Gender * Experience * Qualification**) show no significant effects, with p-values well above 0.05. This suggests that the combined effects of these factors do not significantly influence the estimates of the study sample.
- **Error**: The large sum of squares for error (183.60) and the degrees of freedom (370) suggest that there is considerable unexplained variation within the data.
- **Total**: The total sum of squares (230.05) represents the total variability in the data, including all sources of variance.

The results of the triple variance analysis indicate that **Gender** has a significant effect on the estimates of the study sample, albeit with a small effect size. **Years of Experience** and **Educational Qualification** do not show significant effects, although educational qualification approaches marginal significance. The interaction terms between the variables do not seem to significantly affect the results. These findings suggest that gender differences may play a role in shaping perceptions of online learning's impact on developing students' skills for a knowledge-based economy, but other factors like experience and qualification do not appear to have a substantial influence.

Table 6 shows the interaction effects of Gender, Years of Experience, and Educational Qualification on the arithmetic averages of the estimations from the study sample as well as the results of a three-way ANOVA (Analysis of Variance). For every major effect and interaction, the table shows the sum of squares, degrees of freedom, mean square, F-values, eta squared (η^2), and p-values, therefore offering understanding of the relevance and strength of each factor.

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1. Gender (Main Effect)

- Gender indicates a statistically significant main impact with an F-value of 5.62 and a p-value of 0.023. This implies that the estimations of the study sample are much influenced by gender. Although the gender variations are statistically significant, the eta squared ($\eta^2 = 0.01$) shows a small effect size, thereby explaining just a minor share of the variability in the estimations.

  • The important influence of gender suggests that teachers, both male and female in the Green Line area, could view the function and efficiency of online learning in improving students' skills in somewhat different ways. This result is important since it emphasizes the need of considering gender-based viewpoints while designing or assessing online learning interventions meant at skill development for a knowledge-based economy.

2. Years of Experience (Main Effect)

- The main effect of **Years of Experience** is not statistically significant, as indicated by the F-value of 1.27 and the p-value of 0.283. This suggests that the number of years of experience that teachers have does not significantly affect their estimates regarding the effectiveness of online learning in developing students' skills.

- Given that years of experience is a common factor used to explain variability in educational outcomes, this finding suggests that teachers' views on online learning are relatively consistent regardless of how long they have been teaching. It may indicate that factors other than experience, such as familiarity with technology or specific training in online instruction, might play a larger role in shaping teachers' perspectives.

3. Educational Qualification (Main Effect)

- The main effect of **Educational Qualification** is marginally significant, with an F-value of 2.42 and a p-value of 0.095. While the result is not statistically significant at the conventional 0.05 level, the p-value suggests that there may be a trend towards significance, meaning that teachers with different educational qualifications might have slightly different views on online learning.

- The small effect size ($\eta^2 = 0.04$) indicates that educational qualification explains only a small portion of the variability in the estimates. However, this result is worth noting,

as it implies that higher or more advanced levels of qualification might influence teachers' perceptions, even if the effect is not large enough to be statistically conclusive.

4. *Interaction Effects*

- The interactions between **Gender and Years of Experience**, **Gender and Educational Qualification**, **Years of Experience and Educational Qualification**, and **Gender, Experience, and Qualification** all yield non-significant results, as evidenced by the high p-values (all greater than 0.05). This suggests that there are no significant combined effects between these variables on the estimates.

- These findings indicate that while individual factors such as gender and educational qualification may have some effect on teachers' views, their combined effects do not significantly alter the perceptions of the study sample regarding online learning. This could imply that each factor independently influences the estimates, without notable interaction effects.

5. *Error Term*

- The **Error** term (sum of squares = 183.60) represents the unexplained variation in the data. This suggests that a significant portion of the variability in teachers' estimates is not accounted for by the independent variables or their interactions. The error term's degrees of freedom (370) reflect the number of data points that contribute to this unexplained variance, reinforcing the idea that factors beyond gender, experience, and qualification likely play a role in shaping teachers' perceptions.

6. *Total Variation*

- The **Total** sum of squares (230.05) represents the total variation in the data. The fact that the error term accounts for a large portion of this variation emphasizes the complexity of the factors influencing teachers' estimates. While gender appears to have a statistically significant impact, most of the variability remains unexplained by the factors in the model.

- Table 6's three-way ANOVA findings show that gender significantly, if somewhat, influences how the study sample views the function of online learning in shaping students's skills in a knowledge-based economy. Still, Years of Experience and Educational Qualification seem to have little bearing on these impressions. The lack of notable interaction effects implies that the results are not much affected by the combined influence of gender, experience, and qualification.

- The results underline the need of include gender into evaluation of teachers' opinions on online learning. They also imply, though, that other variables—such as teachers' technological knowledge and particular training—may have more bearing than years of experience or educational background. The big error term emphasizes the need of investigating other variables and elements that could influence instructors' opinions on online learning in order to help to explain their variations. Emphasizing the necessity to address gender variations in online learning perspectives while appreciating the complexity of other impacting factors, these results offer insightful information overall for future study and educational policy.

Recommendations

1. Improving the digital infrastructure in Green Line schools would help them to fully realise the advantages of online learning. This covers guaranteeing consistent internet

connectivity, giving teachers and students appropriate tools, and creating technical support services. All kids will have equal access to learning possibilities once the digital divide is bridged.

2. Implementing a thorough professional development program will help teachers to acquire the required skills and knowledge to properly include online learning platforms into their instruction. This curriculum ought to address pedagogical techniques for involving students in online environments in addition to the technical side of employing digital technologies.

3. Online learning ought to be a tool for encouraging among students critical thinking and cooperation. Activities meant to promote group discussions, peer feedback, and cooperative problem-solving chores should be planned by teachers. This will enable students acquire the interpersonal and teamwork abilities vital for the knowledge-based economy.

4. The hybrid learning model—that which combines online and in-person education—can present the best of both worlds. This concept offers freedom while still preserving the advantages of in-person contacts. Schools should give hybrid learning techniques some thought in order to accommodate several learning environments and raise student involvement.

5. Schools should work with content suppliers to provide a greater spectrum of digital learning tools like e-books, interactive simulations, and instructional films. These materials can satisfy different learning styles and help pupils grasp difficult subjects.

6. Attend to Equity in Education: The problem of equitable access to online learning resources has to be resolved. Programs aimed at giving low-income pupils access to digital gadgets and internet connectivity should be set up. This guarantees that budgetary restraints never cause any student to fall behind.

7. Teachers should help pupils to acquire self-regulation abilities so they may take charge for their own learning. With their adaptability, online learning environments offer a perfect setting for students to grow in autonomy in controlling their learning process, including establishing goals, tracking development, and looking for more materials.

8. Schools should aggressively hunt for and implement creative learning aids that improve results by means of tools. This covers investigating gamification, artificial intelligence (AI)-driven platforms, and tailored learning technologies that meet students' particular requirements.

9. Governments, educational institutions, and commercial sector companies should work together to develop policies and programs supporting the integration of online learning into schools. By means of this cooperation, funds can be secured, resources can be provided, and guarantees of that all benefits of online learning are reachable.

10. Ensuring that online learning programs are fulfilling the intended learning outcomes depends on constant assessment and evaluation of them. Schools should set up systems for teachers and students to offer opinions on the success of online learning environments, therefore guiding next developments.

By implementing these recommendations, educators and policymakers can enhance the effectiveness of online learning, thereby helping students develop the necessary skills to thrive in a knowledge-based economy.

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