Efficacy of Online Learning on the Development of Students' Academic Competence: A Case Study of Yemeni Undergraduate Students Studying in India

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Abstract

This study investigates the efficacy of online learning on the academic competence of Yemeni undergraduate students in India. It examines whether online learning delivers adequate quality education by evaluating students' academic competence levels. Two groups of Yemeni students participated: 27 Arts students and 35 Science students, from five Indian universities. The Academic Competence Evaluation Scale (DiPerna & Elliott, 2000) was employed to assess students' competence through online learning, with data collected online and analyzed using SPSS. The scale was used to evaluate Yemeni students' academic competence through online learning. Descriptive statistics indicated moderate levels of academic competence for both groups. Despite the Arts group showing higher scores, the Independent Samples T-test revealed no statistically significant difference between the groups. Pearson Correlation analysis demonstrated a significant positive correlation between students' academic skills and academic enablers. Furthermore, Linear Regression analysis indicated that academic skills significantly impacted academic enablers. The findings suggest that online learning can be a viable alternative during Covid-19, provided that certain adjustments are made. This study contributes to the growing body of knowledge on online learning, particularly in developing countries like Yemen, offering empirical evidence for policymakers, educators, and institutions on its effectiveness and areas needing improvement. The results underscore the importance of integrating academic skills and enablers into online learning environments to enhance academic competence among students.

Keywords: online learning, Covid-19, Yemeni undergraduate students, academic competence, academic skills, academic enablers

1. Introduction

The global outbreak of the Covid-19 pandemic precipitated a significant crisis worldwide, profoundly impacting various sectors, including education (Bączek, 2021; Crawford et al., 2020; Dhawan, 2020; Khan, 2020; Mohmmed et al., 2020; Naik et al., 2021; Yuan, 2021). In response to the pandemic, governments worldwide implemented preventive measures, including the closure of educational institutions (Engzell et al., 2021). This led to the largest educational interruption in history, affecting approximately 94% of the global student population (United Nations, 2020). Consequently, the global education system faced substantial challenges as on-site education was suspended, compelling teachers to transition to online teaching to continue students' classes (Abbasi et al., 2020; Dhawan, 2020; Mohmmed et al., 2020).

India was significantly impacted by the Covid-19 pandemic, recording the second-largest number of cases globally after the United States (Elflein, 2021). To curb the rapid spread of the virus, a nationwide lockdown was implemented, severely affecting the education system by confining more than 300 million Indian students to quarantine (Mathivanan et al., 2021; Sharma & Singh, 2020; Younesi & Khan, 2020). To mitigate learning loss, the Central Government of India mandated all educational institutions to transition to online learning as an emergency measure (Naik et al., 2021). Consequently, educational institutions were compelled to adopt online learning immediately, without prior training or preparation for students and teachers. Naik et al. (2021) noted that while the sudden shift to online learning was relatively easy for private institutions in India, it posed significant challenges for public ones. Sharma and Alvi (2021) argued that the closure caused by Covid-19 severely affected the education and learning methods of higher education students in India.

Many Indian universities claimed success in implementing online classes and being adequately prepared regarding technological facilities at

the onset of the Covid-19 pandemic, while others admitted facing challenges in adapting to this novel teaching method and accessing the internet (Naik et al., 2021). Despite these challenges, educational institutions had no alternative but to adopt e-learning to continue classes. Mathivanan et al. (2020) observed that educational institutions reluctant to change their traditional teaching practices had no choice but to embrace online learning during Covid-19. Similarly, in the United States, higher education institutions had to rapidly transition to online learning, facing varied levels of readiness and access to technology. Hodges et al. (2020) reported that while some universities had existing online programs and infrastructures, others struggled with the sudden shift, highlighting disparities in technological readiness and faculty training. In Brazil, the shift to online learning revealed significant digital divide issues, where students from lower socio-economic backgrounds faced challenges in accessing reliable internet and digital devices (Gonzalez et al., 2020).

Today, many educational institutions are replacing in-person education with online learning, which may continue as the primary mode of instruction post-Covid-19. Online learning, a subject of discussion for decades, gained immense momentum during the pandemic, compelling the world to shift entirely to online education. Thus, the Covid-19 pandemic presented both challenges and opportunities, disrupting traditional learning and providing a chance to invest in technology for education (Ali, 2020; Kantipudi et al., 2021; Mukhtar et al., 2020; Naik et al., 2021).

Numerous studies have explored various aspects of online learning, including learners' attitudes, readiness, engagement, and satisfaction, as well as its advantages and disadvantages (see Uden et al., 2022; Polat, 2024). However, there is a paucity of research examining students' academic competence in online learning. This study aims to address this gap by measuring the academic competence of Yemeni undergraduate students engaged in online learning during the Covid-19 pandemic. Given the uncertain duration of online learning and the indefinite timeline for reopening educational institutions in India, this study is significant for identifying the academic competence levels of Yemeni undergraduates in this context.

Several studies have shown that many educational institutions and learners worldwide have accepted online learning as a viable teaching method (Abbasi et al., 2020; Khan et al., 2020) for its flexibility (Khan et al., 2020; Shukri et al., 2020; Kohnki & Moorhouse, 2020), cost-effectiveness (Bali & Liu, 2018; Hannay & Newvine, 2006), student-centeredness (Dhawan, 2020; Mukhtar et al., 2020), ease of use (Khan et al., 2020), and enjoyability (Agarwal & Kaushik, 2020). However, other studies have raised questions about the instructional appropriateness of online learning and learners' readiness to engage in such a learning environment (Junaidu, 2006; Watkins et al., 2004). Research has revealed that while today's learners are well-versed in traditional classroom settings, they lack experience and readiness in online learning environments (Naik et al., 2021; Watkins et al., 2004; Widodo et al., 2020). In Indonesia, for example, a study by Widodo et al. (2020) found that many students faced difficulties in adjusting to online learning, primarily due to lack of familiarity and inadequate digital literacy. Similarly, in Nigeria, Junaidu (2006) highlighted that both teachers and students were unprepared for the sudden shift to online learning, revealing gaps in digital skills and infrastructure. Other studies have also indicated that the abrupt transition to online learning in response to Covid-19 posed significant challenges, including teachers' inadequate experience in conducting live classes, learners' unpreparedness, and technical issues faced by learners in rural areas (Kantipudi et al., 2021; Yuan, 2021; Wang et al., 2020).

Early research also indicated that not all students are eager to immerse themselves in online learning, particularly those whose courses require face-to-face interaction, such as engineering (Yusof & Amir, 2007, as cited in Abu Mansor & Ismail, 2013). Additionally, online learning may not be as effective for science and engineering disciplines as it is for other fields (Junaidu, 2006). Naik et al. (2021) found that teaching laboratory and practical classes online is challenging. According to them, online learning is suitable for theoretical classes, but presents difficulties for laboratory and practical classes. Similarly, Mukhtar et al. (2020) identified the teaching and learning of practical and clinical work as a limitation for Pakistani instructors and students in online learning. Thus, the loss of practical classes could lead to inequity in learning outcomes between science students and those from other fields.

The primary objective of this study is to examine the efficacy of online learning in developing Yemeni undergraduate students' academic competence. Early identification of students' academic competence levels will help researchers highlight the strengths and weaknesses of online learning and propose pedagogical strategies to enhance its effectiveness. The study aims to explore learners' academic competence, including reading/writing skills and critical thinking skills, as well as academic enablers, which comprise interpersonal skills, motivation, engagement, and study skills.

The potential contributions of this study are multifaceted. It seeks to elucidate the academic competence levels of students participating in online learning, thereby identifying areas that require enhancement in online education delivery. Additionally, the study aims to offer actionable recommendations for educators and policymakers to improve the efficacy of online learning environments. The findings are anticipated to serve as a valuable reference for subsequent research on online learning and its impact on academic competence, particularly in analogous educational settings. Considering all the related points, the study tries to answer the following research questions:

1. To what extent are students academically competent through online learning during the Covid-19 pandemic?
2. Are there any statistically significant differences at ($\alpha \leq 0.05$) between Arts and Non-Arts students in the total level of academic competence and its related sub-skills?
3. Is there any statistically significant relationship at ($\alpha \leq 0.05$) between students' academic skills and their academic enablers?
4. Is there any statistically significant effect at ($\alpha \leq 0.05$) of students' academic skills on their academic enablers?

2. Literature Review

Online Learning

Online learning, or e-learning, encompasses the process of delivering educational content to students through the internet while they remain in their respective locations. Hrastinski (2008) articulates online learning as the process of teaching and learning facilitated by network technologies. Similarly, Appana (2008) describes online learning as a form of distance learning conducted remotely via the internet. Castro and Tumibay (2019) further elaborate that online learning involves studying an educational course through the web, effectively utilizing it as a virtual classroom.

The modality of online teaching and learning can be categorized into synchronous, asynchronous, and hybrid formats. Synchronous learning necessitates the simultaneous attendance of students and instructors at a predetermined schedule, whereas asynchronous learning allows instructors to upload educational materials that students can access at their convenience. Hybrid, or blended learning, combines elements of in-person education with online interaction. In the context of our increasingly digitalized world, a plethora of technological tools are employed to facilitate online classes. These tools are typically classified as synchronous—such as MS Teams, Zoom, Google Meet, Skype, Moodle—and asynchronous—such as email, Edmodo, MOOC, Facebook, Google Classroom.

Almahasees et al. (2021) indicate that synchronous learning involves teachers and students meeting each other at a predetermined time for interactive classes, whereas asynchronous learning allows teachers to deliver the course material without real-time interaction with students. Hrastinski (2008) characterizes asynchronous e-learning as a flexible educational approach, enabling learners to engage with materials at their own pace and schedule via emails, discussion boards, and similar platforms. In contrast, synchronous e-learning is depicted as more structured and time-sensitive, requiring real-time interaction between educators and learners through live video conferencing and chat functionalities. Mohmmed et al. (2020) assert that synchronous learning is a highly organized and time-bound pedagogical strategy, whereby courses are delivered virtually using tools like MS Teams and Moodle. Conversely, asynchronous teaching is portrayed as an adaptable method not constrained by specific time frames, facilitating the exchange of materials and communication between teachers and learners through social networking tools.

The efficacy of asynchronous learning is particularly notable for individuals with time constraints. Mohmmed et al. (2020) underscore the flexibility of asynchronous learning, emphasizing its ability to provide busy learners who are unable to attend live sessions with the opportunity to access materials according to their own schedules. Fidalgg et al. (2020) delineate synchronous learning as an instructional method in which educators and learners convene in a virtual session at a designated time. In contrast, asynchronous learning is defined by the absence of immediate interaction between educators and learners, allowing learners to access course materials at their discretion.

Advantages of Online Learning

Many studies have investigated the effectiveness of online learning across different regions, highlighting various advantages. For instance, Mukhtar et al. (2020) found that online learning in medical colleges at the University of Punjab, Pakistan, was comfortable, manageable, convenient, economical, facilitated administrative work, and encouraged student-centered learning. Similarly, Hussein et al. (2020) explored the attitudes of Emirati undergraduate students towards emergency online learning during COVID-19. Their results indicated advantages such as time and cost-effectiveness, safety, convenience, and improved participation.

Akuratiya and Meddage (2020) examined the perceptions of Sri Lankan students at Advanced Technological Institutes towards online learning during the COVID-19 pandemic. The findings suggested that students perceived online learning as effective, enjoyable, self-paced, and accessible. Davis et al. (2019) also identified advantages for both students and instructors, noting flexibility, self-motivation, and the ability to work independently for students, while instructors benefited from improved communication, course management, and course design flexibility.

Almahasees et al. (2021) examined the perceptions of Jordanian faculty and students regarding online learning during the COVID-19 pandemic. The study identified several advantages of online learning, such as cost-effectiveness, enhanced scheduling flexibility, and improved time management for both faculty and students. It also enabled students to gain new experiences and skills, and the ability to revisit recorded lectures, thereby deepening their understanding and retention of course material. Furthermore, online learning increased accessibility for students with diverse needs and geographic limitations.

Al Rawashdeh et al. (2021) examined UAE students' views on the benefits and drawbacks of e-learning in university settings. Students highlighted several advantages of e-learning. Firstly, e-learning provides flexibility, allowing students to access course materials and complete assignments at their own pace. This flexibility is particularly beneficial for students juggling multiple responsibilities, such as work and family commitments. Additionally, e-learning facilitates access to a wide range of resources, including multimedia content, which can enhance understanding and retention of course material. The ability to review lectures and materials multiple times was also seen as a significant benefit, as it helps reinforce learning.

The impact of specific online tools has also been studied. Alqahtani (2019) investigated the use of Edmodo among students at Imam Abdulrahman bin Faisal University and found significant improvements in learning skills and positive attitudes towards the tool.

Similarly, Abed et al. (2022) found that effective communication between students and instructors was identified as a crucial factor in improving students' beliefs and engagement with online learning. The quality of online instruction also played a significant role in enhancing students' willingness to participate in online education. Additionally, some other studies displayed that online learning was advantageous for being flexible (Almahasees et al., 2021; Castro & Tumibay, 2019), self-paced (Fidalgo et al., 2020), and cost-effective (Almahasees et al., 2021; Bali & Liu, 2018; Fidalgo et al., 2020; Hannay & Newvine, 2006).

Disadvantages of Online Learning

Despite the benefits, online learning presents several challenges. One significant disadvantage is the lack of face-to-face interaction between students-teacher and students-students, leading to feelings of isolation and reduced sense of community among students, which can negatively impact motivation and engagement (Almahasees et al., 2021; Akuratiya & Meddage, 2020; Wut & Xu, 2021). Akuratiya and Meddage (2020) investigated the perceptions of Sri Lankan students at Advanced Technological Institutes towards online learning during Covid-19 pandemic. They reported some challenges that faced students, which included reduced interaction between teachers and learners, social isolation and technical problems. Other challenges include the lack of experience of instructors on using digital tools (Kantipudi et al., 2021; Wang et al., 2020), teaching practical work (Mukhtar et al., 2020; Naik et al., 2021) assessing students' performance, especially practical one (Mukhtar et al., 2020; Osman, 2020), lack of electricity facility or continuous power cut (Kantipudi et al., 2021; Naik et al., 2021), technical issues like inaccessibility or poor connectivity to the internet in rural areas (Almahasees et al., 2021; Osman, 2020; Wang et al., 2020), reduced focus, heavy work load, technology and internet issues and insufficient support from instructors and colleagues (Hussein et al., 2020).

Abed et al. (2022) investigated Saudi Arabian Students' beliefs about and barriers to online education during the COVID-19 pandemic. This study found that the sudden shift to online learning due to COVID-19 posed significant challenges for students in Saudi Arabia. Key barriers included technical issues, lack of motivation, and personal challenges. Al Rawashdeh et al. (2021) examined UAE students' views on the benefits and drawbacks of e-learning in university settings. Students pointed out several disadvantages of e-learning. A common concern was the lack of face-to-face interaction, which can lead to feelings of isolation and hinder the development of interpersonal skills. Likewise, Blizak et al. (2020) found that Algerian students had negative attitudes towards abrupt transitions to online learning due to obstacles such as internet disruption, stress, lack of virtual labs, and decreased interactivity.

Almahasees et al. (2021) identified several disadvantages of online learning in Jordan, including challenges in maintaining student engagement and motivation, ensuring academic integrity, and providing hands-on learning experiences. Additionally, technical issues and the digital divide significantly impeded the effectiveness of online education. Davis et al. (2019) also noted obstacles for students, including misinterpreting expectations and time management issues, while instructors faced challenges in setting expectations, providing feedback, and maintaining interpersonal relationships.

Sharma and Sandeep (2021) indicated that online learning during COVID-19 affected various stakeholders, including students, educational institutions, parents, and the government. Students from regions like Ladakh, Lakshadweep, and Bihar faced poverty and lack of technological tools, while students with disabilities struggled to cope with online learning. Educational institutions dealt with unpreparedness, unwillingness to adopt online methods, and lack of teacher training. Parents faced financial challenges due to job losses, and the government struggled with poor infrastructure and policy implementation. Mukhtar et al. (2020) noted limitations in Pakistan, such as difficulties in practical and clinical teaching, assessing student understanding, and managing resources, along with issues of academic dishonesty. Mukuka et al. (2021) found that Zambian secondary school students faced challenges in remote learning, with inadequate access to ICT, electricity, and internet services.

Competence

Competence is the popular term that was coined by Chomsky (1965) which refers to speakers' innate or unconscious knowledge of their language. Chomsky has later referred to the term competence as grammatical or linguistic competence. Chomsky (1965) referred to linguistic competence as the unconscious knowledge of grammar that enables a speaker to utilize and comprehend a language. However, Chomsky's theory of linguistic competence was criticised by Hymes (1972) who claimed that learning a foreign language is not confined to developing linguistic competence but also involves learners in developing several communicative aspects. Therefore, he presented the term communicative competence which refers to how learners use linguistic competence suitably in a social context. According to Hymes (1972) communicative competence is the knowledge that a speaker needs to retain in order to communicate appropriately within a particular speech community.

Learners need to have good competence in order to perform learning tasks appropriately. Fr ás (2014) points out that in a typical EFL/ESL classroom, teachers are always accountable for teaching, simplifying or ordering students to perform some educational tasks and how to perform those tasks appropriately. Performing such tasks involve students in employing different kinds of competencies ranging from generic competencies which include receptive/productive skills, to other types of disciplinary competencies like knowing, analysing, applying, synthesising, evaluating, etc.

Academic Competence

Academic competence is defined as a multifaceted factor comprising skills, attitudes, and behaviours that promote success in the classroom (DiPerna & Elliott, 2002, p. 293). Academic competence, as delineated by DiPerna and Elliott (2002), constitutes a

comprehensive construct that amalgamates essential academic skills and pivotal academic enablers, thereby underpinning successful educational outcomes. At the core of academic competence lie academic skills, which are referred to as the fundamental and complex skills that represent the core of academic education in primary and secondary schools (DiPerna & Elliot, 2002). Academic skills encompass foundational literacies such as reading comprehension, writing proficiency, and numerical fluency. These skills are indispensable for the assimilation and application of knowledge across various domains of learning. Reading comprehension involves the ability to decode, interpret, and critically engage with texts, while writing proficiency entails the coherent and effective expression of ideas. Numerical fluency, on the other hand, encompasses the capacity to understand and manipulate numerical data, which is critical for problem-solving and analytical reasoning.

Complementing these academic skills are academic enablers, which are a mixture of attitudes and behaviours that enable a student to perform and benefit in an academic environment (DiPerna & Elliot, 2002). Academic enablers include a range of psychosocial and behavioral attributes that facilitate the effective deployment of academic skills. Motivational factors, such as intrinsic and extrinsic motivation, drive students' engagement and perseverance in academic tasks. Intrinsic motivation stems from an inherent interest in the subject matter, while extrinsic motivation is fueled by external rewards and recognition. Moreover, academic enablers encompass robust study skills and behavioral engagement. Study skills include time management, note-taking, and test-taking strategies, all of which are crucial for academic success. Behavioral engagement, characterized by regular attendance, active participation in class, and completion of assignments, reflects a student's commitment to their educational pursuits. Interpersonal skills, such as collaboration and communication, enable students to work effectively in group settings and contribute to a positive learning environment (DiPerna & Elliot, 2002).

Prior research has assessed learners' academic competence predominantly through the lens of cognitive abilities, emphasizing metrics such as academic achievement and performance in specific subjects, which are indicative of scholastic success (Herman et al., 2008; Valiente et al., 2008). In contrast, DiPerna and Elliott (2000) introduced a more holistic evaluation of academic competence. Their framework integrates both cognitive and non-cognitive skills, acknowledging the multifaceted nature of academic success within the educational context.

Statement of the Problem

Due to the nationwide lockdown in response to Covid-19 pandemic, the educational institutions were forced to shut down. Suddenly, learners were unable to attend their regular face-to-face classes, and teachers and learners were required to switch to online teaching/learning mode overnight without being familiar or fully prepared to deal with such novel method. Thus, the sudden transition to teaching/learning online with inadequate preparation of teachers and learners, lack of technological facilities and facing technical issues put the quality of online learning into question. Mohmmed et al. (2020) state that instructors were suddenly asked to teach digitally with the primary focus on transforming the curriculum into an online milieu instead of focusing on creating an effective online pedagogy environment. Therefore, it is crucial to evaluate learners' academic competence in order to have clear understanding of the efficacy of online learning method on developing such competence.

3. Methodology

Design of the Study

The study adopted a quantitative method. It employed an online questionnaire to collect the data. The questionnaire was distributed to 62 Yemeni students studying in five Indian universities. These very universities have been surveyed because they host a sizeable number of Yemeni undergraduate students. A convenience sampling technique was used to select the study sample.

Participants

The participants of the study are first, second and third year Yemeni undergraduate students of Arts and Science majors. They have been drawn taken from five Indian universities. None of these students has ever studied in an online mode during their high school study in Yemen. Due to closedown implemented in India in response to Covid-19 pandemic, these students have started studying their courses through online mode.

Instrument

The Academic Competence Evaluation Scale (ACES) designed by DiPerna and Elliott (2000) was distributed to 62 Yemeni undergraduate students studying in five Indian universities. The scale contains 56 items that have been used to evaluate students' academic competence. The scale consisted of two main categories: academic skills and academic enablers. Academic skills consisted of 20 items that were measured on a 5-point scale ranging from (1) Far Below, (2) Below, (3) At Average Level, (4) Above, (5) Far Above. Academic enablers contained 36 items which were measured on a 5-point scale ranging from (1) Never, (2) Rarely, (3) Sometimes, (4) Often and (5) Always. The Mathematics/Science section of the scale has been excluded in this study because the study has Arts students in which they may be low proficient in mathematics/science. Further, some modifications and clarifications are added to the items in a way that fits the objectives of the study.

Procedure

A well-designed Google forms questionnaire was distributed online. Social networking tools were highly beneficial in reaching students in the five universities surveyed. The questionnaire was distributed to the participants privately through their WhatsApp accounts and

collectively in WhatsApp groups. The questionnaire was distributed at the end of the academic year 2020/2021. It was distributed online to students between the 26th of June 2021 and the 8th of July 2021. The data collection has taken a period of two weeks. The completion of the questionnaire was estimated to take approximately 10 to 15 minutes from respondents. 62 valid responses were obtained.

Data Analysis

The Statistical Package for the Social Sciences software program .24 for windows was used to analyse the results of the study. Frequencies and percentages were used to analyse the respondents' personal information. Descriptive statistics, including means and standard deviations were used to analyse students' responses for the Academic Competence Evaluation Scale. Differences between means of Arts and Science groups were tested for significance using the Independent Sample T-test. Correlation between academic skills and academic enablers was tested using Pearson Correlation test, and the effect of academic skills on academic enablers was tested by using Linear Regression test. The criterion for significance was set at alpha 0.05.

Reliability of the Construct

Table 1. Reliability of the Construct

Variables	Cronbach's Alpha	N of Items
Academic Skills	0.952	20
Academic Enables	0.962	36
Academic Competence	0.970	56

The standard value of Cronbach alpha is between .70 and .90. The results in Table 1 indicate that the Cronbach alpha of academic skills is 0.952, academic enables is 0.962 which all indicate a high value that is classified as excellent. The first two variables are combined together which formed the umbrella term *academic competence*. Thus, academic competence factor is tested for reliability, and the obtained value is 0.970 which shows a high value. These high values indicate that all items are clearly explaining their respective variables and, therefore, allowing for further analysis.

4. Results

Demographic Information

Table 2 provides the frequency distributions and percentages of Yemeni undergraduate students' personal information which includes five variables: year, major, age, gender and university.

Table 2. Personal Information of Sample Participants (N = 62)

Variables	Particulars	Frequency	Percent	Valid Percent	Cumulative Percent
Year	First Year	7	11.3	11.3	11.3
	Second Year	23	37.1	37.1	48.4
	Third Year	32	51.6	51.6	100.0
	Total	62	100.0	100.0	
Academic Major	Arts	27	43.5	43.5	43.5
	Science	35	56.5	56.5	100.0
	Total	62	100.0	100.0	
Age	18-24	24	38.7	38.7	38.7
	Above 25	38	61.3	61.3	100.0
	Total	62	100.0	100.0	
Gender	Male	57	91.9	91.9	91.9
	Female	5	8.1	8.1	100.0
	Total	62	100.0	100.0	
University	Aligarh Muslim University	24	38.7	38.7	38.7
	Lovely Professional University	11	17.7	17.7	56.5
	Swarmi Ramanand Teerth Marthwada University	9	14.5	14.5	71.0
	Kerala University	8	12.9	12.9	83.9
	Kakatyia University	10	16.1	16.1	100.0
	Total	62	100.0	100.0	

As indicated in Table 2 that the demographic information of the participants included year of study, major, age, gender and the name of the universities that they are studying in. The results in Table 2 revealed that the majority of the participants (51.6%) were in the third year, (37.1%) were in the second year, and 11.3% were in the first year. The results also exhibited that the majority of the participants (56.5%) belong to science major, and 43.5% belong to Arts major. 61.3% of the participants belong to the age group above 25, and 41.7% belong to the age group 19-24. As presented in Table 2 that the majority of the participant 91.9% are males and only 8.1% are females. The sample is drawn from five universities: Aligarh Muslim University, Aligarh; Lovely Professional University, Panjab; Swami Ramanand Teerth Marathwada University, Nanded; Kerala University, Kerala; Kakatiya University, Hyderabad.

Twenty-four (38.7%) of the participants were taken from Aligarh Muslim University, eleven (17.7%) were from Lovely Professional University, nine (14.5%) were from Swami Ramanand Teerth Marathwada University, eight (12.9%) were from Kerala University, and ten (16.1%) were from Kakatiya University.

Table 3. Evaluation Criteria for the Academic Competence Degree

Scale	Degree
1.00 – 2.33	Low mean value
2.34 – 3.67	Average mean value
3.68 – 5.00	High mean value

Descriptive Statistics Results

Descriptive statistics, including means and standard deviations were used to analyse and measure the overall level of academic competence of the two groups of the study. Table 4 introduces the means and standard deviations of the overall level of academic competence for Arts and Science groups as well as the level of academic competence in six skills.

Table 4. Means and Standard Deviations of Arts and Science Groups in Academic Skills and Academic Enablers

	Arts Group			Science Group		
	N	Mean	Std. Dev.	N	Mean	Std. Dev.
Academic competence	**27**	**3.48**	**1.04**	**35**	**3.40**	**0.76**
Reading	27	3.53	1.11	35	3.17	0.73
Critical Thinking	27	3.31	1.13	35	3.44	0.55
Interpersonal Skills	27	3.39	1.00	35	3.46	0.71
Engagement	27	3.49	1.13	35	3.36	0.89
Motivation	27	3.48	0.96	35	3.31	0.88
Study kills	27	3.69	0.91	35	3.50	0.88

As shown in Table 4 that the overall mean score of Arts group in academic competence is (M=3.48, SD=1.04) while the total mean score of Science group is (M=3.40, SD=0.76). These mean scores fall within the category of average level (See Evaluation Criteria Table 3). Thus, the total levels of the two groups in academic competence through online learning are moderate.

As explained previously that the umbrella term academic competence comprises two main components: academic skills which include reading and critical thinking skills, and academic enablers which contain interpersonal skills, engagement, motivation and study skills. The means and standard deviations of the students' responses to the academic skills and academic enablers scales are also presented in Table 4.

Regarding the academic skills, the results in Table 4 indicated that the mean score of the Arts group (M=3.53, SD=1.11) was higher than that of the Science group (M=3.17, SD=0.73) in reading skills. On the other hand, the Science group (M=3.44, SD=0.55) recorded higher mean score than the Arts group (M=3.31, SD=1.13) in critical thinking skills.

Relating to the academic enablers, the results in table 4 revealed that the Arts group had high mean scores in engagement (M=3.49, SD=1.13), motivation (M=3.48, SD=0.96), and study skills (M=3.69, SD=0.91) than those of the science group (M=3.36, SD=0.89; M=3.31, SD=0.88; M=3.50, SD=0.88) respectively. However, the Science group showed higher mean score (M=3.46, SD=0.71) in interpersonal skills than that of the Arts group (M=3.39, SD=1.00).

Inferential Statistics Results

In order to answer the second question, an independent-samples t-test was carried to explore the difference between Arts and science groups in their overall level of academic competence, reading skills, critical thinking skills, interpersonal skills, engagement, motivation and study skills. The results in table 5 indicated that the Art groups revealed fairly higher mean scores in the total level of academic competence and in some sub-skills like reading, engagement, motivation and study skills, while the Science group recorded higher mean scores in critical thinking skills and interpersonal skills. However, it is necessary to investigate whether the differences between the two groups reach the level of statistical significance or not.

Table 5 displays the mean differences between the two groups in the overall score of academic competence and its related variables and the t-test for each difference.

Table 5. Results of Independent Sample T-test of Arts and Science Groups in Academic Competence and its Related Sub-skills

	Levene's Test for Equality of Variances		t-test for Equality of Means						
								95% Confidence Interval of the Difference	
	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Reading Skills	5.506	0.022	1.445	42.515	0.156	0.35735	0.24732	-0.14157	0.85628
Critical thinking	21.993	0.000	-0.559	35.441	0.580	-0.13175	0.23563	-0.60988	0.34639
Interpersonal skills	6.430	0.014	-0.310	44.914	0.758	-0.07026	0.22637	-0.52621	0.38568
Motivation	0.001	0.978	0.791	60	0.432	0.16720	0.21138	-0.25564	0.59003

Engagement	1.146	0.289	0.515	60	0.609	0.13192	0.25626	-0.38067	0.64451
Skills	0.380	0.540	0.825	60	0.413	0.18804	0.22796	-0.26795	0.64403
Academic competence	4.510	0.038	0.567	44.299	0.574	0.10708	0.18885	-0.27344	0.48761

The results of the Levens' Test of homogeneity in table 5 show that the F values (0.001, 1.146 & 0.380) are not significant as the P values (p=0.978, 0.289 & 0.540; p>0.05) are greater than 0.05. Thus, we accept the null hypothesis of equality of variances' test which assumes that the distribution of the two groups is equal. These results indicate that the equality of variances is assumed, and the means of the two groups are approximately equal. In other words, there is no significant variability in the mean scores of the two groups in motivation, engagement and study skills. On the other hand, the F values (5.506, 21.993, 6.430 & 4.510) are statistically significant as indicated by the P values (0.022, 0.001, 0.014 & 0.038; p<0.05) which are lesser than 0.05. These results indicate that the two groups are not homogenous in reading skills, critical thinking skills, interpersonal skills and academic competence and; therefore, the equality of variances is not assumed. Thus, we reject the null hypothesis of the equality of variances test, as there is significant variability in the mean scores of the two groups in the aforementioned variables.

The results of Independent Samples t-test in table 5 exhibited that all the T values (1.445, -0.559, -0.310, 0.791, 0.515, 0.825 & 0.567) are not significant as indicated by the P values (p=0.156, 0.580, 0.758, 0.432, 0.609, 0.413 & 0.574; p>0.05) which are all greater than 0.05. These results revealed that the mean scores of the Arts group in the whole variables are not statistically significantly different from the mean scores of the Science group. Though the mean values of Arts group in the total level of academic competence, reading skills, engagement, motivation and study skills are slightly higher than those of the Science group, the differences are still not at the level of significance p<.05. Similarly, the Science group scored higher means in critical thinking skills and interpersonal skills than Arts group, but the difference did not reach the level of significance. Thus, we accept the null hypotheses. It can be stated that there are no statistically significant differences between Arts and Science groups in the total level of academic competence and in all its related sub-skills.

In order to answer the third research question, Pearson Correlation Test was conducted to test the relationship between students' academic skills and academic enablers.

Table 6. Results of Pearson Correlation Test on the Relationship between Academic Skills and Academic Enablers

Variables		Academic Enablers
Academic Skills	Pearson Correlation	.613**
	Sig. (2-tailed)	0.000
	N	62

** Correlation is significant at the 0.01 level (2-tailed).

The results of Pearson Correlation test in Table 6 revealed the existence of strong positive relationship between academic skills and academic enablers at the level of significance (p=0.001; p<.01). The obtained p value (p=0.001) is statistically significant. The correlation value is .613 which shows a valid value as there is no problem with the multicollinearity issues. In other words, the *r* value has not exceeded .70. Thus, an explanation for this significant positive relationship is that when the students' academic skills are improved or get increased to higher levels, the academic enablers get improved too.

To answer the fourth question, Linear Regression Test was carried out to test the effect of students' academic skills on their academic enablers. Table 6 displays the results of Regression analysis.

Table 6. Results of the Regression Test on the Effect of Academic Skills on Academic Enablers

$AE = ß_0 + ß_1\ AS + £$					
Dependent Variable	Independent Variable	B	β	T	Sig.
Academic Enablers (AE)	Academic Skills (AS)	.594	.613	6.016	0.000
R Squared					0.376
Adjusted R Squared					0.366
F					36.195
Sig.					0.000

The results of the Linear Regression test (R=.613; R^2=.376; F=36.195; p=0.001, p<.05) displayed in table 6 indicate that the academic skills explain about 36.6% of the variation of the total level of academic enablers measured by the ACES scale. The results also show that the model is fit indicated by the p value which is significant at the level of 1% level of significance (p=0.001, p<0.05). Regarding the impact of academic skills on the academic enablers, the results exhibit a statistically significant positive effect. The results display that the intercept has a significant positive value (ß=.613) which indicates that the academic skills affect the academic enablers positively. Besides, the results reveal that the academic skills affect the academic enablers positively at the level of 1% of significance (p=0.001, p<0.05). Thus, it can be stated that academic skills have statistically significant effect on the academic enablers.

5. Discussion

The study aimed to measure the academic competence of Yemeni undergraduate students in Arts and Science programs through online learning. The results indicated that the Arts group demonstrated a slightly higher overall level of academic competence and excelled in

certain sub-skills compared to the Science group. However, the Science group outperformed the Arts group in specific sub-skills, particularly critical thinking and interpersonal skills.

The Arts group excelled in language skills, including reading and writing. This result may be attributed to the focus on evaluating language and communication skills within the variable items. This finding seems plausible as Science students are generally more familiar with numeric skills than communication skills. This result aligns with Rajprasit et al. (2014), who found that Thai Engineering undergraduates had fair English language and communication abilities, particularly struggling with productive language skills such as reading and writing. It also corroborates Ali's (2012) findings, which revealed significant difficulties in reading comprehension among Iraqi Engineering undergraduates at Al-Mustansiriya University. Furthermore, Hyland (2013) highlighted that humanities students engage more deeply in writing and reading activities, leading to better proficiency in these skills compared to students in technical fields. Similarly, Zhu and Kaplan (2011) found that engineering students often struggle with academic writing and reading skills compared to their counterparts in humanities and social sciences.

In terms of motivation and engagement, Arts students exhibited higher mean scores in motivation, engagement, and study skills compared to Science students. Arts students primarily study their online courses theoretically, whereas Science students must engage with both theoretical and practical components. The difficulty of teaching practical components online likely impacted the motivation and engagement of Science students. This finding is consistent with Naik et al. (2021), who argued that online learning is more suitable for theoretical subjects than practical ones. Similarly, Mukhtar et al. (2020) identified the inability to teach and learn practical and clinical work as a limitation of online education in Pakistan. Blizak et al. (2020) also reported negative perceptions of online learning among students at the Faculty of Chemistry and Hydrocarbons at the University of Boumerdes, Algeria, due to the absence of virtual chemistry laboratories. This finding aligns with Artino (2008), who found that students studying theoretical content online reported higher motivation levels than those engaged in practical subjects. Hartnett, St. George, and Dron (2011) also found that intrinsic motivation and interest in the subject matter were higher among students studying humanities subjects compared to those in science disciplines. Consequently, the lower levels of engagement and motivation among Science students may stem from the loss of essential scientific information that requires practical explanation. Science students need to conduct experiments in laboratories, which is challenging to replicate through online learning. Means et al. (2014) concluded that while online learning can be effective, it is less effective for courses requiring practical and hands-on activities. Similarly**,** online learning may not provide content knowledge equivalent to on-site learning for Science students. Hence, Junaidu (2006) insists that the quality of online courses in Science and Engineering education should match or exceed that of traditional education. However, this finding contradicts the result of Yang et al. (2024), who concluded that Virtual Reality-based training was suitable for practical studies. That is, Virtual Reality significantly enhanced practical skills among science and engineering students.

Regarding study skills, both groups recorded high mean scores, but the Arts group outperformed the Science group. Study skills included editing assignments before submission, reviewing assignments, timely submission of assignments, preparing for exams, and attending online classes. This finding suggests that students are more extrinsically motivated to learn through online learning, as they are more concerned with securing good marks.

Conversely, the Science group recorded higher mean scores than Arts students in critical thinking skills and interpersonal skills. Science students are typically more engaged in problem-solving activities than Arts students, leading to the development of critical thinking skills through online learning. This finding is supported by Sendag and Odabasi (2009), who examined the impact of an online problem-based course on undergraduate students at the Department of Primary School Mathematics Teaching. They found that the online problem-based learning group significantly improved critical thinking skills, although the effect on content knowledge acquisition was not significant. Additionally, Garrison and Akyol (2013) highlighted that critical thinking skills are often better developed in online learning environments through structured problem-solving and inquiry-based activities.

In terms of interpersonal skills, the Science group outperformed the Arts group. Interpersonal skills included group and pair work, interaction with others, creating arguments, making discussions, and suggestions. Science students, who are perhaps more accustomed to teamwork in laboratories, perceived themselves as proficient in these skills through online learning platforms. This result is consistent with Lindsey and Rice (2015), who compared the interpersonal skills of online students with traditional students by assessing their emotional intelligence using the Situational Test for Emotional Management (STEM). Their findings revealed that students who completed at least one online course reported significantly higher scores in the STEM than those who had not taken any online courses, indicating better development of interpersonal skills among online students.

6. Conclusion

The findings of this study present a nuanced view of the efficacy of online learning in enhancing academic competence among Yemeni undergraduate students during the Covid-19 pandemic. Despite the abrupt transition and initial lack of preparedness, students demonstrated a moderate level of academic competence, with the Arts students exhibiting slightly higher proficiency in certain academic skills compared to their Science counterparts. The study highlights a strong positive correlation between academic skills and academic enablers, underscoring the interconnected nature of various aspects of academic competence. These results suggest that while online learning can be a viable educational method, especially during emergencies, it requires careful implementation and support to optimize its benefits and address inherent challenges. Overall, the study underscores the resilience of students and the potential of online learning to contribute meaningfully to academic development under challenging circumstances.

7. Suggestions & Recommendations

To enhance students' academic competence through online learning, ESL teachers are encouraged to incorporate interactive elements, provide regular feedback, and employ diverse teaching strategies to enrich the online learning experience. Given that online teaching methods are relatively new for Yemeni students, who have not previously studied online courses during their high school education, there is a notable preference for on-site learning. Naik et al. (2021) found that despite the current generation of students being technologically adept, they still show a strong preference for in-person learning. Therefore, to avoid learners' boredom with online learning, teachers should involve students in interactive and engaging activities that motivate their minds. Special efforts should be made to motivate and engage science students, as the results indicated they had lower levels of motivation and engagement than Arts students. Regarding laboratory and practical teaching, the study supports the recommendation of Naik et al. (2021) that the difficulty of teaching such classes online can be mitigated by using virtual lab setups developed by several Indian Institutes of Technology or by displaying live lab sessions and recorded videos. Future research should focus on exploring various online learning platforms, assessing the long-term impacts of online learning on academic competence, and investigating additional factors that influence learning outcomes. Additionally, policymakers are advised to consider these findings in the design and implementation of online learning programs to ensure that they cater to the needs of all students effectively.

8. Limitations

This research has some limitations that must be acknowledged. Firstly, the sample size was limited to Yemeni students studying in India, which may not represent the broader population of Yemeni or other international students. Additionally, the study relied on self-reported data, which could introduce bias or inaccuracies in the responses. The absence of a control group for comparative analysis further limits the robustness of the findings. Alternative explanations for the results might include differences in the nature of the curricula, varying levels of access to online resources, or differing levels of prior experience with online learning. Furthermore, the generalizability of these findings is constrained by the specific context of Yemeni students in five Indian universities, which may not reflect the experiences of students in other universities, countries or educational systems. Differences between the target population and the accessed sample, such as cultural, technological, and pedagogical variations, must be considered. The characteristics of online learning interventions, such as the quality of internet connectivity, the availability of digital devices, and the support provided by institutions, also influence the applicability of the results to other settings.

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Authors' contributions

Dr. Abdullah Abduh Mohammad Ahmed was responsible for the study design and writing, Dr. Hayel Mohammed Ahmed Alhajj was responsible for data collection, Loiy Hamidi Alfawa'ra and Dr. Asim Aboud Zbar were responsible for data analysis, and Dr. Asma'a Ali Abu-Qbeitah revised it.

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