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# A Retrospective Analysis of Interactive Videos and Skill Development in First-Year Seminars at a Higher Education Institution

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**Abstract.** Interactive videos can be a powerful tool in higher education. Soft skills are crucial indicators of success during the first year of university. Consequently, many universities have integrated first-year seminar courses into their programs to equip students with essential skills for academic success. This retrospective quantitative study investigates the impact of using interactive videos to enhance skills in first-year seminars. It analyses a sample of 538 female students from various colleges in Qatar University who took a first-year seminar course in the Fall 2022, Spring 2022, or Spring 2023 semesters. Across 19 classes, these students were provided with six interactive videos covering the following skills: transferable skills, time management, critical thinking, problem-solving, growth mindset, learned optimism, and academic integrity. Students were retrospectively divided into three groups based on how many interactive videos they watched: 0, 1-5, or 6. Controlling for students' high school grade-point averages, we compared scores on the final exam between groups using ANCOVA. Scores differed significantly among the three groups ( $p < 0.05$ ). Specifically, those who viewed all interactive videos had the highest scores in the skill application scenarios in the final exam. In conclusion, this study is the first to report that interactive videos might benefit specific higher education students who need to further develop their skills but are unmotivated to do the extra work and learn from the additional resources provided interactively.

**Keywords:** soft skills, First-Year Seminar course, interactive videos, skills enhancement, student performance, higher education

## 1. Introduction

The first year of university is a continuous process in which students adapt to a new academic environment, often causing stress and anxiety (Conley et al., 2013; Tett et al., 2017). The student dropout rate is known to be higher during the first year of university than during subsequent years (Opazo et al., 2021), ranging from 6% to 20% across countries (Aina et al., 2022). The problem is that first-year

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students find it hard to adapt to university needs, which affects their grades and leads to a higher dropout rate during this critical period (Purnamasari et al., 2022). This issue has prompted universities to develop specific programs to enhance retention rates and support students in their academic journeys (Goodman & Pascarella, 2006; Keup et al., 2023). For example, universities have incorporated first-year seminars to teach students the skills they need to succeed academically, such as time management and academic integrity (Elobaid et al., 2023; Goodman & Pascarella, 2006; Keup et al., 2023). First-year seminars have been shown to improve overall grade-point averages (GPAs) and retention rates, demonstrating their value in promoting academic success (Keup & Barefoot, 2005; Permzadian & Credé, 2016).

Various pedagogical techniques can be employed within these courses to enhance learning outcomes and improve student skills. Soft skills are key to university and career success (Detgen et al., 2021; Lee, 2018). Many technological advances can aid with learning soft skills. For example, video-based learning can support students at different levels since they control such techniques. In addition, video-based learning is a form of self-directed learning (Chartrand et al., 2021). Accurate and reliable videos are usually easily accessible and available anytime for students.

With highly advanced learning management systems (LMS), such as Blackboard, teaching methods have diversified, complementing traditional teaching methods. Video-based learning in flipped classrooms and interactive video-based learning have all been found to improve academic performance by enhancing student engagement and learning outcomes (Bishop & Verleger, 2013; Sablić et al., 2021; Yousef et al., 2014). These methods improved academic performance and fostered better learning experiences (Chen et al., 2008). Sablić et al. (2021) explored the effectiveness of video-based learning on student-learning outcomes, teachers' reflections, and feedback in 39 peer-reviewed studies. However, despite the growing adoption of these technologies, there remains a gap in the literature regarding the specific impact of interactive video-based learning on skill performance in first-year seminars within higher education.

Video-based learning is a tool for enhancing academic achievement (Sablić et al., 2021). However, the extent to which this technology supports first-year university students learning the skills required to succeed remains unknown. Therefore, this study aimed to address this knowledge gap. Before outlining our approach, the following section reviews current knowledge of interactive video-based learning and the skills emphasized in first-year seminars.

## **2. Literature Review**

### **2.1. Interactive Video-Based Learning**

Video-based learning is a teaching method that presents information to learners in an engaging manner (Yousef et al., 2014) and has been extensively reviewed (Brame, 2017; Noetel et al., 2021; Poquet et al., 2018; Sauli et al., 2018). This approach allows learners to control the content by pausing, playing, repeating, and accessing additional resources. Video-based learning can take various forms, including screencasts, lecture capture, or recorded web lectures (Woolfitt, 2015).

The benefits of this method include increased student engagement and motivation (Nikopoulou-Smyrni & Nikopoulos, 2010). Video-based learning has been shown to enhance learning outcomes (Balslev et al., 2005; Kersting et al., 2012). It can be integrated into a blended model within traditional face-to-face classrooms, either during or outside class time, often called a flipped classroom. This hybrid learning approach is more beneficial than replacing traditional learning entirely with videos (Noetel et al., 2021; Shih, 2010). However, learners remain passive viewers of traditional videos (Kolås, 2015). More recent research focuses on the type of task presented in videos. Tasks that require deeper thinking positively impacted video viewing and learning (Gijssen et al., 2024). Video-based learning supports cognitive theory, which states that providing demonstrations with questions and interactions enhances deeper thinking, thereby supporting students' understanding of the material (Mayer, 2008).

With advancements in technology, interactive videos have emerged in higher education. An interactive video is a digitally enriched form of the original raw video sequence, allowing viewers various interactive and navigational features (Hammoud, 2006). These features may include quizzes, gamification, and simulations, all of which contribute to a more engaging and stimulating learning experience (D'Aquila et al., 2019). Students report greater engagement and enjoyment with interactive videos than traditional videos due to their interactive elements (Hung et al., 2018). Compared to non-interactive videos, interactive videos improved learning outcomes by enhancing understanding, knowledge retention, and skill development (Brame, 2017). Incorporating interactive videos with homework assignments can further deepen understanding of complex concepts (Brame, 2017). Interactive videos support self-directed learning and accessibility, allowing students to control their learning pace and access information multiple times, fostering self-directed learning and better knowledge retention (Afify, 2020). Retrospective studies (i.e., studies that are based on data collected for other aims or educational purposes) have shown that video-based learning enhanced students' performance across subjects (Farooq & Al-Jandan, 2015; Murthykumar et al., 2015; Persky & Dupuis, 2014).

Despite the various types of video-based learning, such as standard demonstrative non-interactive, Blackboard-style videos (Wolf & Peyre, 2018), interactive videos, and simulation-based learning (Pham et al., 2021), all utilize visual cues and narrative content. Instructors are sometimes featured in the videos. Students reported that Blackboard-style videos were particularly informative due to their combination of visual and narrative content and the ability to control the pace of learning (Wolf & Peyre, 2018).

Students indicate that having control over the pacing of videos enhances their learning (Wolf & Peyre, 2018). There are various types of videos, including recorded lectures (theoretical or practical) and mini-interactive videos. Students who had access to different types of videos achieved better results over three academic years than those who did not (de la Fuente Sánchez et al., 2018). In clinical learning, passive videos have less impact than active learning methods. Students were more satisfied with interactive and non-interactive videos (Preradovic et al., 2020). Among the different types of videos, medical students

who had access to simulation-based videos achieved better results over three academic years than those who did not (Preradovic et al., 2020). Simulation videos are a re-creation of real-world situations. Simulation can be helpful in some disciplines and not within first-year seminars. Both simulation and interactive videos are visual educational tools to enhance students' learning and self-directed study. While interactive videos support self-regulated study effectively, they should be complemented by other pedagogical techniques to enhance learning (Granjo & Rasteiro, 2018). Several online platforms, such as Edpuzzle (Pulukuri & Abrams, 2020) and Echo360<sup>†</sup>, can integrate interactive videos.

Massive Open Online Courses have been shown to support the development of soft skills, such as creativity and digital literacy, especially in lifelong learners (Cinque, 2017). Some have leveraged technology to enhance soft skill development in higher education, yielding favorable outcomes (Morin & Willox, 2022). One study evaluated the effectiveness of a fully online course called Passport, which aimed to teach first-year students 12 soft skills, including problem-solving and communication skills. Its results indicated that students who participated in the online course, which included an interactive database of exercises and quizzes, reported improved self-evaluation of these skills (Emanuel et al., 2021). Studying interactive videos is interesting since they provide timely feedback to students, providing an additional opportunity to strengthen their knowledge and skill learning.

## 2.2. First-Year Skill Acquisition

Soft skills are crucial to success in university and beyond (Lee, 2018; Murthy, 2016). One essential skill is self-regulated learning, also known as self-directed learning. Self-regulated learning encompasses cognitive (e.g., critical thinking), metacognitive (e.g., planning), and recourse strategies (e.g., peer learning) (Xu et al., 2023). Consequently, universities have incorporated specific courses into their programs to help students develop these essential skills. One widely implemented course is the first-year seminar, which aims to support student learning of twenty-first-century skills through effective educational practices (Skipper, 2017). Notably, the types of first-year seminars vary. Some are considered extended orientation; others are academic with various or uniform content, while some are hybrid. Regardless of the format, we focus on teaching first-year students self-regulated learning skills.

Qatar University, the only public university in Doha, Qatar, features a first-year seminar course as a cornerstone of most of its programs. This course has been investigated and shown to positively impact student outcomes (Al-Sheeb et al., 2018a; Al-Sheeb et al., 2018b; Elobaid et al., 2023; Kishta, 2019). Comparatively, students at Qatar University who completed this hybrid first-year seminar course had better retention rates and higher GPAs than those who did not (Elobaid et al., 2023). Previous meta-analyses widely support the positive impact of first-year seminar courses (Permazadian & Credé, 2016). Therefore, the effectiveness of this course in contributing to student success at the university is evident.

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<sup>†</sup> To access Echo360, visit this link: <https://echo360.com/>

### **2.3. High School GPA Can Predict Success in University**

The high school GPA is recognized as a significant predictor of success in university. Many studies have shown that it is a strong and reliable indicator of students' academic achievement at university (Richardson et al., 2012; Shulruf et al., 2008). Its predictive power is attributed to the fact that it reflects students' mastery of content and their study habits, time management skills, and overall academic discipline – traits essential for succeeding in higher education (Bowen et al., 2009; Geiser & Santelices, 2007).

Research also indicates that the high school GPA is often better than standardized test scores, such as the Scholastic Aptitude Test (SAT) or American College Testing (ACT), in predicting college outcomes, including first-year GPA and retention rates (Allensworth & Clark, 2020; Hiss & Franks, 2014). This predictive superiority has been observed across various student demographics and educational contexts, indicating that the GPA is a robust metric for forecasting academic success (Kobrin et al., 2008).

In addition to predicting first-year performance, the high school GPA may moderate or mediate the effects of other educational practices and interventions (Robbins et al., 2004). For example, students with higher GPAs entering university may already possess effective study strategies, making them more responsive to specific pedagogical approaches, such as interactive learning methods, while potentially reducing the perceived impact of these interventions. Consequently, when assessing the effectiveness of educational pedagogy on student success, particularly during the critical first year of university, it is essential to control for the high school GPA to account for its underlying influence on student outcomes (Bowen et al., 2009). The high school GPA measures past academic achievement and is a comprehensive indicator of various skills necessary for university success (Qadhi et al., 2020). Its ability to predict success highlights the importance of considering the GPA when evaluating educational practices and policies to improve student performance in higher education. However, a knowledge gap exists in the impact of interactive videos on skill learning within first-year university courses. In addition, most previous research that studied video-based learning did not control for high school GPA.

### **2.4. Aim of the Study**

Overall, interactive videos are considered a valuable addition to university teaching methods. This study aims to answer the following research question: To what extent do interactive videos in first-year seminars impact female student grades in the final exam? This study assesses the role of interactive videos in skill development and improvement. We monitored student engagement with recorded videos across three cohorts at Qatar University. The skills selected for assessment include time management, transferable skills, critical thinking and problem-solving, growth mindset, learned optimism, and academic integrity (Appendix 1). To achieve this, we divided students into three groups based on their exposure to interactive videos: the first group did not view any of the six videos, the second group viewed 1–5 videos, and the final group viewed all six videos. The hypothesis was that students who failed to view any of the interactive videos would perform worse than those who viewed all of the interactive videos.

Therefore, we grouped students who did not view any of the videos and those who viewed all of the videos separately. Within the retrospective data, some students viewed some of the interactive videos (1–5). We chose to place them in a separate group as they do not belong in either the first or the second group. We compare students' final grades among these three groups.

### 3. Methodology

#### 3.1. Research Design

This retrospective quantitative study retrieved data related to the UNIV100 course at Qatar University. All students must register for this course in their first year as a requirement for graduation. Therefore, a large number of students register for this course every semester. The Core Curriculum Program (CCP), which offers this course, opens more than 60 classes (also known as sections) per semester. Out of over 60 sections per semester, we selected data from 19 across the Fall 2022, Spring 2022, and Spring 2023 semesters. This selection was based on the presence of interactive videos and the availability of objective viewership data. Two instructors taught these 19 sections. Already collected for educational purposes, this data included one final exam and reports on interactive video viewership for six different videos. The dependent variable was the grade on the final exam. The independent variables were the viewership of the interactive videos and the high school GPA.

#### 3.2. Research Locale and Study Sample

##### 3.2.1. First-Year Seminar at Qatar University

The research subjects were students taking first-year seminar courses at Qatar University, the only public university in Doha, Qatar. As of the Fall 2023 semester, the university had 23,224 registered students<sup>‡</sup>, with a retention rate of 87% for the Fall 2022 cohorts. Qatar University ranks second in the Arab world and 208<sup>th</sup> in the 2023 QS World University Rankings. Its colleges and programs aim to fulfill its strategic goals, primarily focusing on the CCP<sup>i</sup>. The CCP is central to developing all academic programs and specializations at the university level. The courses in the CCP are organized into six knowledge packages: Identity and Communication, Social and Behavioral Sciences, Natural Sciences and Mathematics, Humanities and Arts, Knowledge and Skills, and Supplementary.

The first-year seminar course (UNIV100) is part of the CCP Supplementary Package at Qatar University. It is included in the study program of all colleges at Qatar University except Engineering, Medicine, and Pharmacy. The UNIV100 course facilitates students' transition from high school to university. It aims to ease this transition by teaching essential skills such as learned optimism, transferable skills, a growth mindset, academic integrity, critical thinking, creative thinking, practical thinking, problem-solving, and time management. Instructors who teach this course receive specific training and hold at least a master's degree. This course is based on the book *Keys to College Success* by Carter and Kravits

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<sup>‡</sup> Facts and figures on Qatar University registration and retention rates are publicly available on this page:

[https://its.qu.edu.qa/sites/en\\_US/offices/CSDO/departments/Institutional-Research-and-Analytic/key-indicators-dashboard](https://its.qu.edu.qa/sites/en_US/offices/CSDO/departments/Institutional-Research-and-Analytic/key-indicators-dashboard)

(2014). Qatar University has a gender-segregated campus; this study focused on only female sections. This course is also offered in English and Arabic; this study focused only on Arabic sections.

This course employs various strategies for learner-centered education, including ad hoc video-based learning. These videos can be interactive, featuring embedded questions to assess the learner's knowledge. Instructors use the Blackboard LMS<sup>§</sup> and Echo360 active learning platform to provide videos for students to watch outside classroom hours. Despite adopting learner-centered education strategies, the impact of interactive videos on skill acquisition in first-year seminars remains relatively unexplored.

Two lecturers taught this course and trained in the latest methods through numerous professional development workshops organized by Qatar University and other academic institutions. Each lecturer holds electronic badges for General University Education (Core Curriculum Certificate<sup>\*\*</sup>), Learner-Centered Education, Digitization-Enhanced Education, Entrepreneurial Education, and Experimental Education<sup>††</sup>.

### 3.2.2. Participants and Procedure

As mentioned above, this study collected data from 19 sections of the UNIV100 course at Qatar University covering the Fall 2022, Spring 2022, and Spring 2023 semesters, encompassing 224 responses. These sections were selected because they included embedded interactive videos, and the data was readily available for analysis. The students were divided into three main groups based on the number of videos they viewed. Viewing data was extracted from Echo360 for all the videos included in this study. The final exam grades for the 19 sections were also recorded in an Excel spreadsheet, focusing on the five-question exams. Next, the Echo360 viewing data and final exam grades were merged. Then, the data was de-identified to ensure student anonymity.

The final sample was divided into three groups based on students' engagement with the interactive videos. To be marked as having completed a video, students must have watched the entire video and answered the accompanying questions at least once. As mentioned above, students were presented with six interactive videos throughout the course and were free to view all of them while taking the course. While viewing the videos was not graded, students were encouraged to do so as it benefited their learning. The three cohorts were divided into the following groups:

- The first group included students who did not view the six interactive videos.
- The second group comprised students who viewed 1–5 interactive videos at least once.
- The final group consisted of students who viewed all six interactive videos at least once.

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<sup>§</sup> To access the Blackboard LMS, visit this link: <https://www.blackboard.com/>

<sup>\*\*</sup> <https://www.qu.edu.qa/en-us/core/professional-development/cc/Pages/default.aspx>

<sup>††</sup> <https://www.qu.edu.qa/en-us/offices/cetl/education-excellence-themes>

This grouping was determined based on several considerations. First, we decided to assess all skills collectively to ensure the generalizability of the data. Second, since the final exam differed across the three cohorts within the 19 sections, some students were not tested on skills corresponding to the videos they had watched. While all students had to watch the six interactive videos, not all were assessed on all six skills in the final exam. By combining the skills in the analysis, we ensured a larger sample size and minimized the potential statistical errors that could arise from running multiple analyses for each skill.

### 3.3. Research Instruments

#### 3.3.1. Description of Interactive Videos

At Qatar University, the Blackboard LMS is used to share course content with registered students. Instructors can also provide various types of media on this platform, including audio, visuals, and videos. Two instructors created explanatory videos using Echo360<sup>##</sup> and embedded them on the Blackboard LMS. The instructors are trained to utilize these technological tools for educational purposes. First-year seminar instructors at Qatar University have undertaken professional development workshops (mentioned in Section 3.2.1) in 2020–2021, supported by the American Association of Colleges and Universities<sup>##</sup>. These videos included interactive questions to engage students. This integration allows instructors to view and download data on student engagement, including who viewed the videos, how often they were viewed, and the percentage of correct answers. Students are required to sign in using their university credentials to access course content on the Blackboard LMS and Echo360. Both platforms provide detailed data on viewership and students' online activity within the course.

In each section assessed in this study, students had the opportunity to view six interactive videos covering the following skills: transferable skills, time management, critical thinking and problem-solving, growth mindset, learned optimism, and academic integrity. These videos were developed by the first-year seminar-trained instructors and varied in length from 2 to 15 minutes. Some skills, such as time management, were divided into multiple videos covering aspects such as goal setting, priorities, values, and time management strategies. The goal was to create short- to medium-length videos for these skills. Other skills tested in the first-year seminar course, such as reading using the SQ3R strategy (i.e. S: Survey, Q: Question, R: Read, R: Recite, and R: Review) and leadership skills, were taught using different pedagogical methods and were not included in this study. While instructors encouraged students to view the interactive videos, viewing them was not a component of the course grade.

Each video included at least one question embedded to assess the student's understanding of its content. All questions were multiple choice, designed to provide automatic feedback to students. After answering a question, students

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<sup>##</sup> For more information on interactive 360 videos, see this link:

<https://youtu.be/Mfri2KRMDEc?si=VUEcNuxiQjpUs4Wq>

<sup>##</sup> <https://www.aacu.org/about>



could repeat what they had seen or continue watching the rest of the video. The correct answers were displayed automatically after the question was answered.

### 3.3.2. Scenario-Based Final Exam

As a core component of the UNIV100 course at Qatar University, students must complete a final exam at the end of the semester. The exam lasts two hours and is standardized across all course sections, regardless of the instructor. It is developed by a committee, including the CCP team, ensuring that the exam questions are consistent in level and type. The final exam consists of a matrix of questions designed to assess students' ability to apply various skills taught throughout the course in different scenarios. Students are given two hours to complete the exam, which presents five scenarios with follow-up questions. On average, the exam tests approximately 5–9 skills covered in the course.

The exam is paper-based and includes more skills than the explicit skills tested in this study. However, this study only used the grades for the tested skills. Each was assigned a maximum score of 5 points, and these scores were then adjusted to a 0–10-point scale for analysis. The final score was calculated by averaging the points for the six skills and multiplying them by 100. Grading was based on a rubric developed and agreed upon by the exam committee members for the UNIV100 course in the CCP.

### 3.3.3. High School GPA

To further control for student achievement, students' high school GPA was retrieved from the Cognos management system used at Qatar University. As these are first-year students, they will not have a previous GPA at Qatar University. We also collected data on students' ages and colleges when taking the UNIV100 course to provide a more detailed sample description.

## 3.4. Data Analysis

Statistical analyses were conducted using IBM SPSS software (version 29). First, descriptive statistics were used to summarize students' grades and numbers of interactive videos viewed for each skill. Detailed information about the interactive videos will also be included in this paper. Next, final exam grades for the six examined skills were compared between students who viewed the interactive videos and those who did not using analysis of covariance (ANCOVA), controlling for their high school GPA. This approach thoroughly examines the impact of interactive videos on student outcomes in the first-year seminar course (UNIV100) at Qatar University, ensuring a focused, concentrated analysis of any significant variations in academic performance among the three groups. When substantial differences were found, post-hoc Bonferroni tests were used to identify the specific skills most impacted by the interactive videos. The significance level was set at  $p < 0.05$ .

## 3.5. Ethical Consideration

This study was approved by the Institutional Review Board at Qatar University (QU-IRB 132/2024-EM) on May 2, 2024.

### 3. Results

#### 3.1. Participants' Characteristics

The study sample comprised 538 female students with a mean age of 20.59 years (standard deviation [SD] = 4.83). The number of students in each cohort was 282 in Fall 2022, 108 in Spring 2022, and 148 in Spring 2023. The mean high school GPA across participants was 84.49 (SD = 9.04); however, this data was available for only 439 participants.

Most participants were from the College of Arts and Science (29.18%), followed by the College of Education (23.61%) and the College of Sharia and Islamic Studies (19.70%). The least represented colleges were Dental Medicine, Medicine, and Nursing, with one student each, likely because they do not require students to take the UNIV100 course; those students who took it were presumably aiming to transfer to other colleges where the course is required.

#### 3.2. Effect of Viewing Interactive Videos on Final Exam Scores

Among participants, 158 (29.37%) had viewed none of the videos, 243 (45.17%) had viewed 1–5 of the videos, and 137 (25.46%) had viewed all six videos. Table 1 provides the mean and standard deviation of participants' ages, high school GPAs, and grades for each seminar skill by group. As expected, participants with higher high school GPAs were more likely to view the interactive videos. The final exam score was out of 100, while the grades for each skill were out of 10. The final exam scores are the most accessible. The best-learned skill was "Growth Mindset and Learned Optimism," with a mean score of 9.15 (SD = 1.81). Conversely, the worst-learned skill was "Time Management," with a mean score of 7.22 (SD = 2.64). The mean score on the final exam was 81.48 (SD = 15.70).

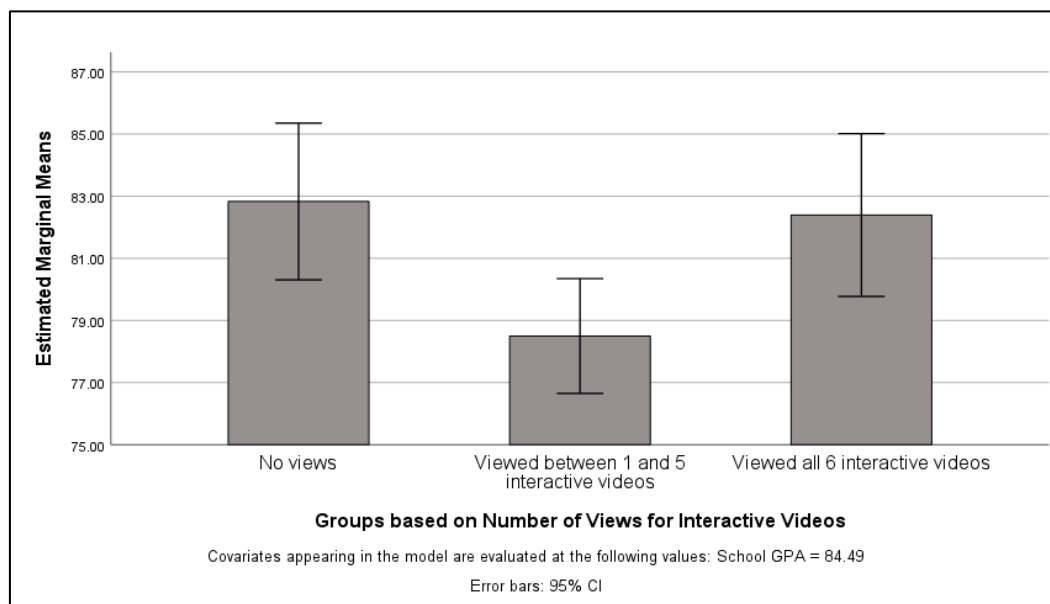
**Table 1. Mean age, high school GPA, and grades for the six skills (/100) among participants in each group.**

	Groups Based on the Number of Views of Interactive Videos							
	Viewed no videos		Viewed 1–5 videos		Viewed all six videos		Total	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Age	21.09	4.90	19.91	4.01	21.22	5.85	20.59	4.83
High School GPA	82.34	8.06	85.12	8.95	85.56	9.90	84.49	9.04
Academic Integrity	7.80	3.09	7.96	3.05	8.60	2.96	8.08	3.05
Critical Thinking	8.29	1.92	7.93	2.34	8.62	1.83	8.19	2.14
Growth Mindset & Learned Optimism	9.18	1.78	9.06	1.92	9.29	1.64	9.15	1.81
Time Management	7.37	2.77	7.33	2.44	6.85	2.80	7.22	2.64
Transferable Skills	7.86	2.75	8.03	2.34	8.64	1.92	8.15	2.37
Problem-Solving	8.57	2.09	7.36	2.37	8.53	1.67	8.10	2.17
Final Exam Score on the Six Tested Skills	81.61	17.86	79.85	15.59	84.22	12.65	81.48	15.70

The primary analysis was limited to the 439 participants with high school GPAs available. Consequently, the three groups – viewed no videos, viewed 1–5 videos, and viewed all six videos – comprised 117, 215, and 107 students, respectively. These two variables explained 26% of the variance, as indicated by the adjusted

$R^2(0.26)$ . Therefore, the high school GPA and viewership of the six interactive videos explained more than a quarter of the differences in final exam scores among participants.

The estimated means (EMs) based on the post-hoc Bonferroni tests showed that final exam scores were lowest among participants who viewed 1–5 videos (EM = 78.50, standard error [SE] = 0.94) and highest among participants who did not view any videos (EM = 82.83, SE = 1.28) or viewed all six videos (EM = 82.39, SE = 1.33). Figure 1 shows the variance between the three groups: participants who did not view any videos, participants who viewed 1–5 videos, and participants who viewed all six interactive videos. Therefore, unexpectedly, the lowest grades were attained in the group that viewed 1–5 videos.



**Figure 1. Differences in final exam scores for the tested skills between groups, controlling for high school GPA.**

#### 4. Discussion

First-year seminars have been shown to positively impact student success, including improving retention rates and GPAs (Elobaid et al., 2023; Permzadian & Credé, 2016). Implementing interactive videos is considered a best practice in higher education as they enhance skill learning and knowledge retention (Granjo & Rasteiro, 2018). Our study analyzed retrospective data from three cohorts (2022–2023) divided into three groups: students who did not view any interactive videos, those who viewed 1–5 interactive videos, and those who viewed all six interactive videos. After controlling for the effect of high school GPA, our study found significant differences in skill acquisition among the three groups. By controlling for high school GPA, our study aimed to attribute the observed outcomes to the interactive videos rather than differences in students' academic backgrounds.

#### 4.1. Findings

Viewing interactive videos on all tested skills impacted female students' final exam grades in the first-year seminar course, increasing their scores by approximately 5 points out of 100. This finding is consistent with previous research showing the impact of non-interactive and interactive videos on students' academic achievement (Argudo-Serrano et al., 2024; Mohammed & Ogar, 2023; Ploetzner, 2024) and listening skills (Pamungkas et al., 2024). Interestingly, the significant difference was not between students who viewed all interactive videos and those who viewed no videos but between those who viewed some videos and those who viewed all videos. Several factors may explain this finding. First, students who utilized other study materials, such as textbooks or PowerPoint presentations, may have felt less need to engage with the interactive videos. A previous study showed that students who accessed both videos and PowerPoint presentations best retained and understood the knowledge (Robertson & Flowers, 2020). In our study, all students had access to PowerPoint aids in their study material on the Blackboard LMS, which might explain the lack of differences between those who did not view and those who viewed all six interactive videos. Students might not see the added value in using videos, particularly if they have previously achieved academic success with these traditional methods. This preference might have limited their exposure to the benefits of interactive learning, such as enhanced engagement and active learning. This could account for the lack of significant differences between students who did not view any interactive videos and those who viewed all of them. It is possible that some students prefer other study methods and do not benefit as much from interactive videos. Second, students who were highly motivated and practiced self-directed learning likely engaged with all the interactive videos, contributing to their higher exam scores with less variability than the other groups.

In contrast, students who did not complete the videos tended to have lower final exam scores, potentially due to a lack of self-directed learning skills (Taslibeyaz, 2020). Thus, these students may have struggled with accurately assessing their knowledge and applying the skills they should have learned. This partial engagement could also result from time constraints, varying interest levels, or the perception that not all videos were equally relevant or necessary.

Our study indicates that students who viewed all videos performed significantly better on the skills assessed in the final exam than those who viewed only some videos. Students who viewed all the videos had greater self-directed learning and motivation, allowing them to evaluate and improve their learning through the content and timely feedback from the questions embedded within the videos (Deng et al., 2024). The difference was approximately 5 points out of 100, underscoring the positive impact of interactive videos on skill learning, consistent with a previous study (Emanuel et al., 2021). This observation shows that students who viewed all the videos possessed a solid motivation to succeed and a high level of self-directed learning. Embedding questions within the presented videos might have induced deep thinking, as proposed by the cognitive theory (Mayer, 2008), enhancing student learning. These students were more likely to take full advantage of all available resources, recognizing the potential benefits of

interactive videos for skill development. Their commitment to completing the videos reflects a proactive approach to learning, which is often associated with higher academic achievement. In addition, the interactive nature of the videos would have provided opportunities for active learning and self-assessment, leading to more effective skill acquisition. This comprehensive approach likely explains why they also performed significantly better on the final exam.

## 5. Conclusion

As mentioned above, skill learning is crucial to college success, and with the availability of technology, instructors teaching skills could enhance materials for students to support their learning. Our study assessed whether interactive video-based learning supports skill learning in a first-year seminar course. Its findings showed that students in the first-year seminar course at Qatar University demonstrated the ability to apply and succeed in learning several skills, including optimism and growth mindset, critical thinking, problem-solving, time management, academic integrity, and transferable skills. Among these skills, time management was identified as the most challenging since students achieved the lowest score (74%) for this skill. University students who viewed all the provided interactive videos showed the greatest success in implementing these skills effectively, resulting in an additional 4.37 points of the 100 available. Conversely, those who did not view all the interactive videos were disadvantaged. The key outcome of our study underscores the critical role of first-year seminars in developing essential skills for academic and personal success. It highlights the importance of incorporating interactive videos as a pedagogical tool in these seminars.

General education (also called the core curriculum at some universities) could benefit greatly from this addition as many aim to advance student skills rather than impart only knowledge. To further enhance student learning and skill development, we recommend motivating students to engage with the interactive videos by incorporating them into grading or dedicating class time to these resources. Such measures could significantly support long-term learning and skill enhancement, demonstrating the vital role of first-year seminars in preparing students for future success.

One strength of our study is that it controlled for students' cognitive skills, using their high school GPA to account for differences in final exam scores (Cyrenne & Chan, 2012; Danilowicz-Gösele et al., 2017). This approach helps ensure that students' prior knowledge and skills do not bias the results. Additionally, the sample size of over 400 students across different cohorts enhances the generalizability of our findings and mitigates cohort effects. Future studies should replicate our findings in male university students. In addition, they should include a more diverse representation of students from various sociodemographic backgrounds and institutions, including public and private universities.

One limitation of our study is its retrospective design, which restricts its ability to control for additional variables, such as ensuring a uniform video length across skills. Therefore, future studies should control for these variables to exclude them as possible confounders. Notably, our study assessed only six skills, whereas the

course encompasses a broader range of competencies, including digital literacy, research skills, time management, and leadership skills. Future studies should explore the impact of interactive videos on these vital twenty-first-century skills. Finally, future studies should compare the effects of interactive versus non-interactive videos, as this study did not address this aspect.

Our findings recommend implementing interactive videos aimed at enhancing skill learning among female university students, which could be embedded in any course aiming to teach students skills. Qatar University provides its faculty with the support needed to prepare and produce such videos via its institutional services, making integrating such advanced technological support into courses taken at this university a pillar of student success.

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## Appendix 1

### Definitions of Skills within This Study

Skill	Definition
Academic Integrity	“Following a code of moral values in all aspects of academic life, such as classes, assignments, tests, papers, projects, and relationships with students and faculty.”
Critical Thinking	“Critical thinking is the process of gathering information, breaking it into parts, examining and evaluating those parts, and making connections to gain understanding, solve a problem, or make a decision.”
Growth Mindset and Learned Optimism	“Growth mindset is the perception that talent and intelligence can develop with effort.” “Learned optimism is applying disputation pessimistic worldview to use optimism to overcome setbacks and failure.”
Transferable Skills	“Skills applicable to any work or life situation such as flexibility, teamwork, and detail orientation.”
Time Management	“Awareness of how you interact with time makes it easier to create a schedule that moves you toward your goals.”
Problem-Solving	“Put their analytical, creative, and practical thinking skills together to solve problems and make decisions.”

*Note: Skills, assessment writing, and interactive video preparation were defined based on Carter and Kravits (2014).*

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<sup>1</sup> Details on Qatar University’s Core Curriculum Program are publicly available on this page: [https://www.qu.edu.qa/sites/en\\_US/core](https://www.qu.edu.qa/sites/en_US/core)