ASEE AMERICAN SOCIETY FOR ENGINEERING EDUCATION

Paper ID #45622

Exploring the Impact of Panopto on Learner Engagement

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Abstract:

The shift to remote learning necessitated by the Covid-19 pandemic gave rise to new educational learning methods. Starting in 2020 and for an extended period of time, students were unable to attend class in person and relied on virtual learning. Panopto has been used since 2021 as a video management system allowing instructors to record lectures live and post them for students to watch later. Despite mandates being lifted and students returning to class, students routinely ask for lecture videos to continue being posted to aid in study and reinforce comprehension. This study looks at the effectiveness of Panopto through the lens of engagement interaction with the videos.

This research looks at data for the Fall 2022 semester of an undergraduate Thermodynamics course. During this period, attendance was optional to accommodate students' varying safety concerns. Using Panopto, the viewing habits of students were analyzed. The data indicates when the lecture was accessed and how much of each lecture was viewed. The results suggest integrating recorded lecture resources positively impacts learner engagement and enhances student performance. This implies that recorded lectures support learning objectives. It provides teachers a platform to expand learning to suit the needs of all students' learning styles and preferences. The analytics allow instructors to tailor the content to accommodate specific needs.

Introduction:

Panopto is a video management software often linked to a Learning Management Software (LMS) such as Blackboard or Moodle. This allows videos to be embedded into a hybrid or online class. Panopto offers instructors tools to create, edit, and post videos for on-demand learning, so students can access videos from anywhere and take charge of their learning.

Panopto is excellent for recording lectures for hybrid, asynchronous, and flipped classroom teaching formats [1]. It offers many features to create a more immersive experience, similar to traditional learning. Split Screen viewing, bookmarks, searchable transcripts, note-taking capabilities, as well as public forums, are some of the most popular features. These add value to the virtual classroom experience by increasing organization and engagement.

The use of Panopto at the college level has changed from a pandemic necessity to a learning tool that students have come to rely on. Even as in-person classes are in full swing, students still seek to use video lectures for study support, and an alternative learning option. The data used for this study examines the Fall 2022 semester of Thermodynamics, a required undergraduate course. This class was conducted after Covid-19 restrictions were modified to allow in-person classes to resume. During this semester, attendance was not mandatory. The class had 65 students with 27 face-to-face meetings, including 3 testing periods and 24 lectures posted. Students were provided partial notes to use while following along with the instructor. The intent was to complete the notes by solving in-class problems during the lecture or independent work. All lectures were posted using Panopto software, making content available after class completion and throughout the semester [2].

Student Interaction with Panopto:

Split screen viewing is one of the most used features of Panopto. It allows students to see the speaker and the lecture notes simultaneously, creating a virtual classroom similar to an in-person setting (see image 1). Students also have the option to switch between views, choosing to focus on the instructor or the notes alone, and selecting which view is most beneficial at any given moment.

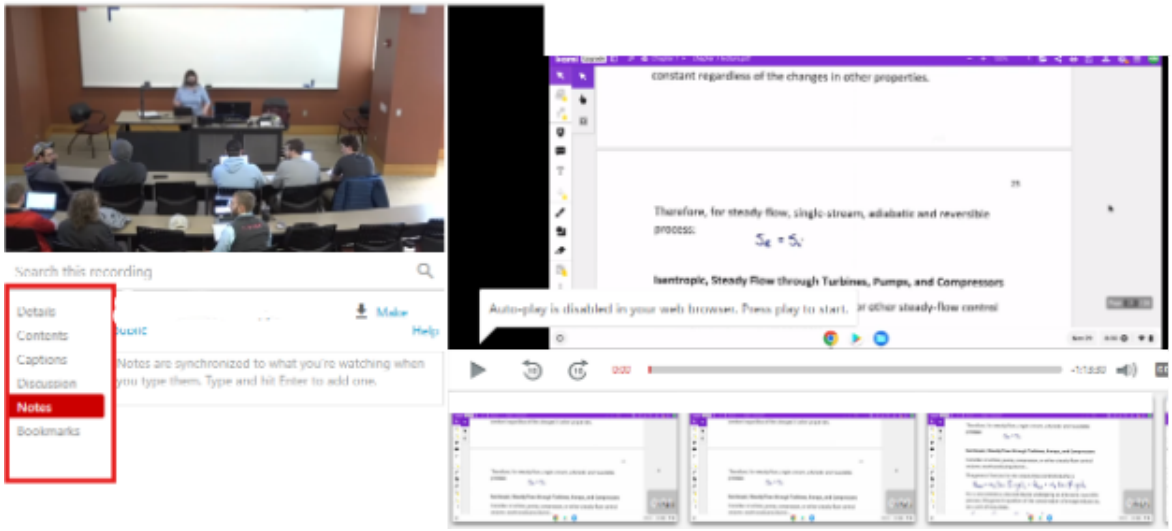

Image 1: User View of Panopto Split Screen and Typical Tools

Additionally, Panopto offers tools for students to navigate content effectively (see image 1). These features include bookmarks, searchable transcripts, and note-taking capabilities. Transcripts allow keywords or topics to be located in the video. Students can add bookmarks to important sections for quick navigation or indicators to mark progress in viewing. The note-taking feature of Panopto allows students to take notes in real-time while watching lectures. Each note is saved at the video time stamp for future views. Notes can be written for private use or posted publicly allowing for brainstorming and community interaction among classmates. These tools provide a wide range of options to promote a learning environment that encourages active learning and participation.

Playback control gives the viewer control over the speed and specific viewing sections of the video. Students can quickly navigate to specific sections to find important content as well as rewatch sections to review and reinforce their understanding. Additionally, students can access Panopto from various platforms including the app, desktop, and embedded viewer. Pre-recorded lectures allow the viewer to set their own pace for success and take an active role in their education through personalized learning.

As students are watching, interest and engagement may diminish over time, due to the absence of a live audience. Panopto has features to combat students' lack of attention or passive engagement due to multitasking or external distractions. Interactive features such as polls, quizzes, discussion groups, or external links can be integrated into the videos, breaking up the screen time.

The goal is to create an engagement point that causes the student to refocus and gauge understanding. These features offer an opportunity for student evaluation, determining if they need a break or if they are ready to continue on with learning.

Instructor Analytics and Insights:

Panopto provides user-friendly statistical data allowing the content creator to monitor student interactions. The software generates charts showing views and minutes delivered by semester, video session, or individual student as seen in images 2 and 3. Panopto keeps logs of the student views/downloads, with each time stamped and view completed. Once a view is conducted, the amount of time viewed corresponds to a video completion percentage. Video completion is based on the percentage of the video watched, not the time spent rewatching the same section of the video. Panopto also records user engagement throughout the recording as seen in image 3. One type of chart generated from Panopto data is a heat map as shown in image 4. Heat maps show peak-watching segments in videos and how the number of students interacting changes over time. The peak points of the data can give insight to the instructor into which sections the students rewatch, helping to define viewing patterns.

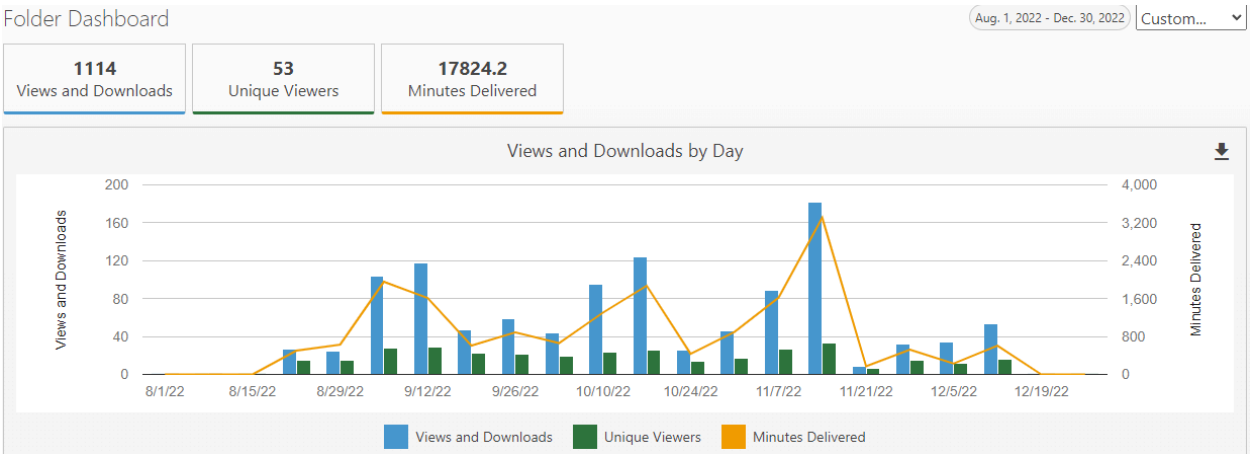

Image 2: Semester Viewing Stats

Image 2 shows the view and downloads by day for the entire semester. The blue columns show the number of views per day, the green columns show the number of individual students, and the orange line shows the minutes viewed per day. From the chart, it is notable that the number of downloads versus the number of viewers is very high. This happens for many reasons but the high number of views for short viewing times can affect averages. As seen from the top table, there were 53 unique viewers with 1114 downloads, watching 17824 minutes of content. The average is 21 views per semester for an average duration of 16 minutes.

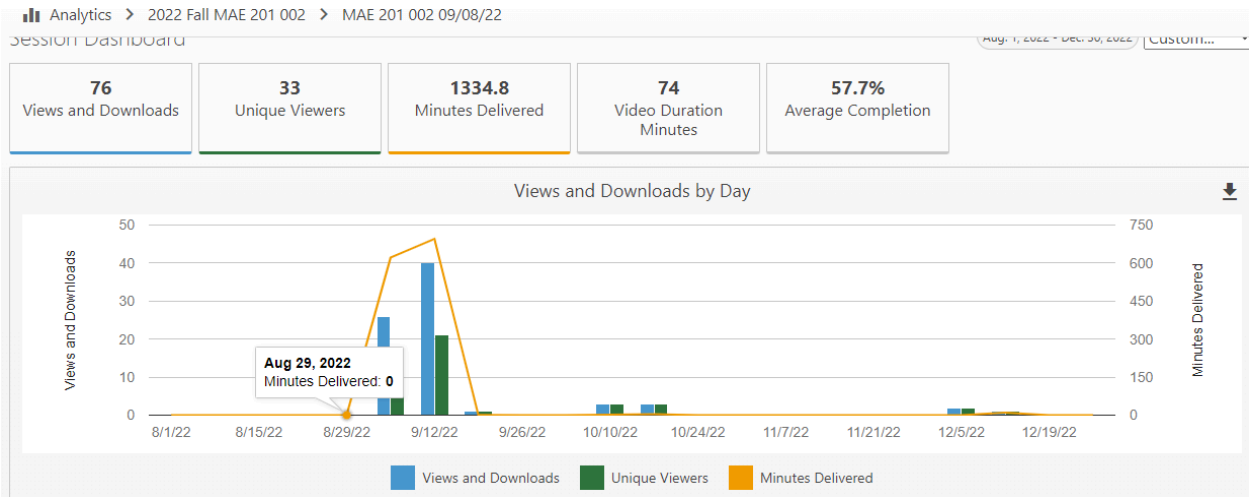

Image 3: Single Video Viewing Stats

Image 3 is a session-focused chart. This chart is only looking at when a specific lecture was viewed during the semester. The top table gives overall stats at a glance. 76 downloads from 33 viewers who watched a combined 1335 minutes with a 58% completion rate. As seen above, most of the views were conducted within a month of the post date. The steep orange line indicates there were long view times during the views shown by the blue columns.

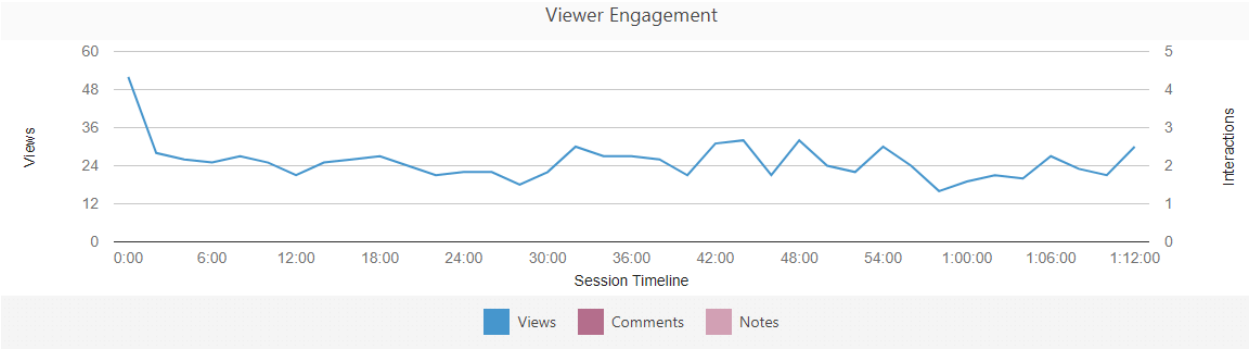

Image 4: Heat Map of Student Engagement

Image 4 is a heat map that quickly and easily shows user engagement over time. This chart can show the number of views, comments made, and notes taken during the video. This chart shows there was a max of 50 viewers at the beginning of the video. The number of watchers drops until the 30-minute mark and rises from 30 minute to 1 hour. The higher engagement may determine what portion of the video is most valuable and what needs more learning time.

By comparing watch data to commonly misunderstood concepts and lower-scoring exam topics, instructors can address these knowledge gaps in upcoming classes. This provides an opportunity to tailor material for review sessions or provide additional materials or examples. This early intervention reinforces challenging topics, helping students build a stronger foundation early on and develop their knowledge as the course progresses.

To conduct more in-depth analytical research from viewers, excel spreadsheets can be downloaded. The data can be filtered by date ranges as well as individual users. Panopto automatically generates standard charts, but in order to conduct more sophisticated analytics, the raw data needs to be extracted. There are three main spreadsheet downloads from different sections of the Panopto dashboard: Views and Downloads, Breakout, and Completion. Each spreadsheet has different raw data sets broken out to show different attributes. Below is an overview of each data variable [3].

“Views and Downloads” are counted together and used to show how long the viewing session was and when it was viewed. “Last View Time” can tell when the video was last accessed. The last position will be displayed in frames per second, indicating what they were watching and which sections were most helpful. “Viewing type” will indicate if the viewer is watching on their desktop or as an embedded viewer. In some cases, the embed has limited functionality not offering notes, forums, bookmarks, or dual screens. Understanding the viewing type could help define viewer interactions with the lecture. Embed viewing can indicate passive learner engagement, whereas the interactive desktop provides more opportunities to engage in active learning by using all of the provided learning tools.

The “timestamp” is a time marker in a video identifying a specific point when a student stopped watching. “Minutes delivered” is the time viewed but does not indicate the order of the actual viewing experience. Observing students with longer watch times could potentially indicate less engagement or less relevant content. “Average minutes delivered” is the time viewed divided by each view. This data can be skewed when a student has short viewing sessions or downloads but never watches. “Percentage complete” is the time viewed divided by the entire video time. This percentage allows instructors to gain insight as to how much of the video is being consumed. Low percentages can be a good indicator of overly long content and can determine if the video needs to be shortened to reinforce engagement.

The “Breakout” data can be used to get an overview of student performance. This is the most useful data in its simplest form. The data determines how many students have watched, the number of views per student, and the time spent viewing. This is a quick way to see if a student is utilizing the system. It helps measure the frequency and any patterns of engagement. High view numbers with shorter watch times may indicate a higher level of engagement.

The “Completion Data” provides the most comprehensive look at the students' engagement patterns and learning styles. Here you can see how they changed over the semester. When did the student start watching? What course events caused them to change their behavior? Many students will not utilize the resource until after the first test, and then begin watching videos before tests. Additionally, some students watch every lecture and continue that pattern throughout the semester. Knowing these patterns can help improve teaching practices and create better video content [4].

There are times when the raw data needs to be examined and more sophisticated analytical tools are needed to extract more results. Images 5 and 6 are examples of data mining. Image 5 shows the days after the video was viewed. The data shows the average delay is between 7-10 days after the live recording was posted as the semester continues the delay increases. This table shows when students watched and which session was watched. Image 6 shows the time viewed versus the days that have past since posting. This chart shows that the watch averages are high regardless of when they are viewed. Data analysis allows deeper insight and more tailored results by custom filtering and grouping. Raw data can be cross-referenced to work with other information such as grades, multiple sections, and other demographics. Having the raw data allows for correlations between student engagement and academic outcomes.

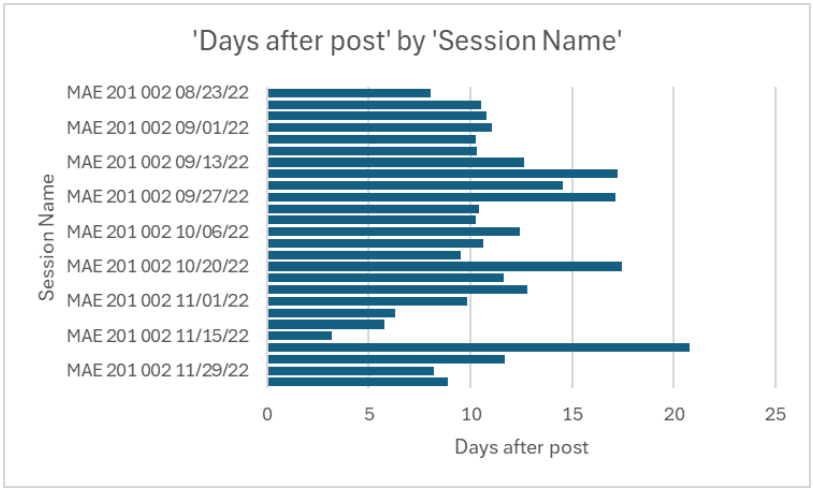

Image 5: Chart showing when students watch after video posting

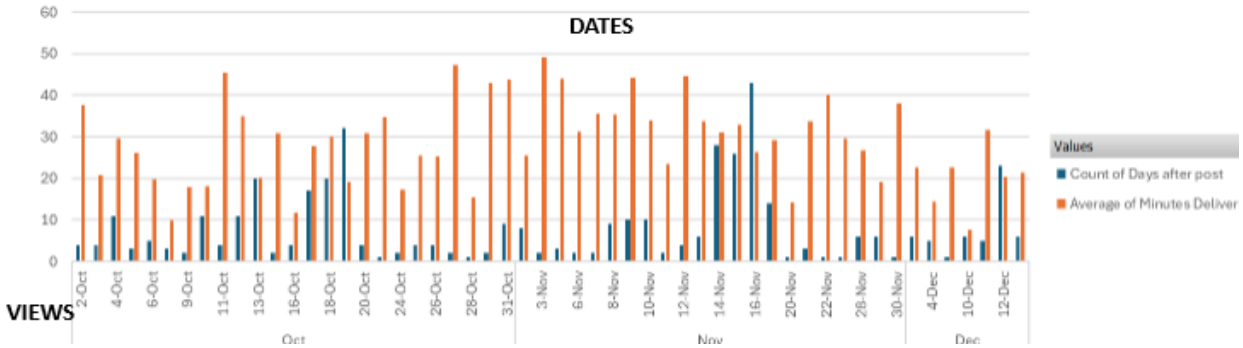

Image 6: Chart showing watch times increase as days pass

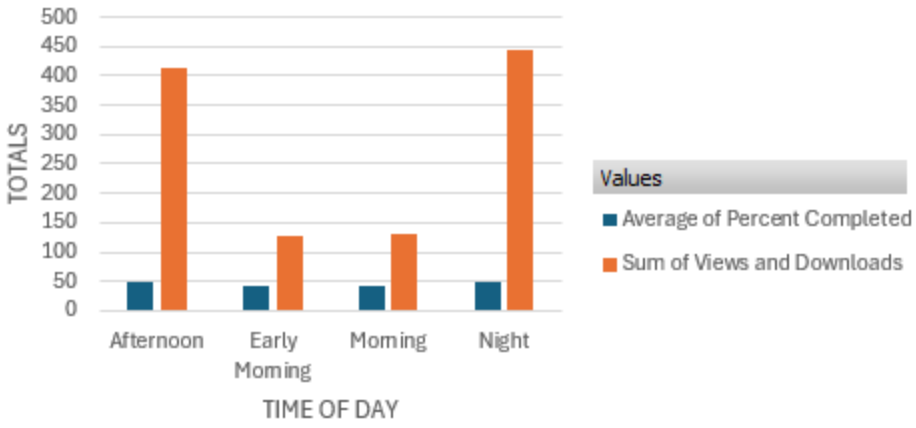

Image 7: Compares Average Viewing Time by Time of Day

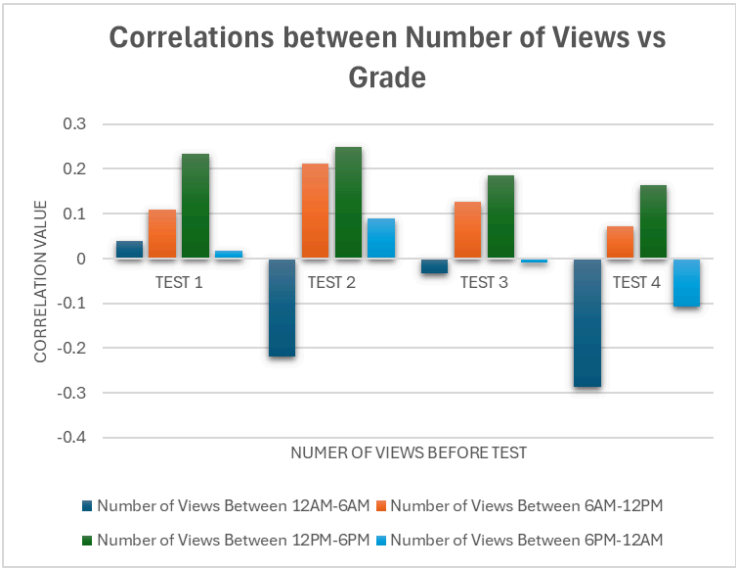

Image 8: Comparing Correlations of Grades to the View Quantity

Image 7 shows a breakout of the time of day students watch during the semester. Afternoon and night time have 4 times higher views than other times. This is due to other activities such as class and work during the daytime hours. This high number of views at night can affect student learning and performance. Cram sessions before exams that are late at night may have very little benefit to grades. As shown in Image 8, the correlation between the time of day students view and the effect on their grades changes throughout the semester. Content and course load are external factors in grades that are present in these trends.

Analysis and Discussion:

The Panopto data from one semester of a Thermodynamics undergraduate course was analyzed to determine how students utilized the recorded lectures since attendance at the in-person lecture was not required. The Panopto videos available to students were not edited. No corrections were made to the captioning, and no additional notes were added.

Data shows trends of highest views before tests and the final exam. During the week before tests, there are many students who access multiple videos per day. Many of these views are short, many less than 30 minutes. In contrast, students who watch lectures soon after the in-person lecture are more likely to watch the entire lecture. These students tend to be less likely to rewatch lectures right before an exam. Using the Last Position viewed and the Percent Complete can identify when and where students stop watching. This can tell instructors what segments the students find useful. This can determine where to shorten videos. Understanding where students rewatch can also indicate what topics are difficult and need more explanation.

Many instructors post videos unedited, and while that is a useful resource, to get the most academic gains from virtual learning it requires video editing. Videos need to be concise, short, and focused, eliminating any non-academic or non-instruction content [5]. To best serve the learner, analytics should be studied to determine critical failure points and tailor videos to aid in learning and structure student's understanding to expand their success. Heat maps (image 4) and other resources help define where students spend most of their time and what they need the most help with. These administrative tools help create better content to ensure learning resources align with student needs.

Panopto provides useful data, but it does have a few drawbacks. Panopto time stamps where students last watched a video, but this is displayed in frames per second. Since the speed of the recording depends on the number of frames per second, this information, albeit useful, is not the easiest to decipher. Panopto also creates engagement charts that illustrate viewer interaction and the number of students viewing at a given instance. However, the data behind these charts is complex and challenging to use. As students navigate a video looking for a certain section of content they will scroll back and forth in the video and create multiple instances of viewing. Rewinding the video skews with this data. It counts additional views in this portion of the video. While the chart output is helpful and rather user-friendly, the raw data points make it difficult to extract meaningful conclusions.

Notably, it is unknown if students are studying in groups or individually. Many students prefer to work together in groups to learn and answer problems. This limitation in the viewing data could lower the number of actual viewers as it will only register one unique IP address. Another limitation is the uncertainty in the type of learning and student engagement. Are students engaged or simply watching or listening to a video? Panopto statistics cannot prove that students are actively learning and working out problems along with the instructor. Time stamps give some insight based on an interaction but, it is unknown how long they pause a video before resuming. This lack of clarity makes it difficult to know how the material is being used and the ability to create an effective learning environment and engaging content. Disengaged students skew the watch metrics by creating long watch sessions without learning.

Understanding student performance is not purely mathematical and cannot be determined by statistical analysis alone. In many cases statistics show low to no correlation between view time, watch time of day, and test outcomes. There are many reasons for this, and many relate to the unknowns described above. Lack of discipline when viewing and low engagement are factors that cannot be represented by quantitative data. To gather a well-rounded understanding of Panopto's significance to students, qualitative metrics need to be used to learn a student's learning style and how they interact with video learning. Correlations and trends change over time during the semester; some reasons for this could be caused by course material getting more difficult over time. Later in the semester, larger amounts of material is required to be known in order to solve more complex problems.

Conclusion:

Panopto is a worthwhile tool to give instructors insight into student behaviors. Using the data, instructors can determine where students are struggling. Panopto data allows instructors to track view times, duration, and frequency. Panopto can help identify content effectiveness as well as learning gaps. Using the Panopto analytics along with in-person class metrics can paint a picture for the instructor of how a student learns and if video resources improve their academic outcome. Comparing minutes delivered and percentage completed to grade trends can correlate if performance is improving test scores over time. This can indicate if more time reviewing material increases understanding.

In conclusion, Panopto serves as a powerful tool that enhances both student learning and teaching effectiveness. Panopto learning creates a virtual environment to aid students in mastering new material. For instructors, Panopto offers valuable insights into student behavior and preferences from adaptive engagement and statistical analytics. These tools allow instructors to customize content to meet the needs of their class. Analyzing Panopto data allows educators to continuously improve their teaching strategies, creating a more dynamic and responsive educational environment. Panopto bridges in-person and virtual learning environments while giving educators the tools to make data-driven decisions to improve instructional quality.

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