The Medical Student Experience With Prework

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ABSTRACT

OBJECTIVES: The objective of this study is to better understand the medical student experience with prework to determine what factors influence their motivation to complete prework.

INTRODUCTION: Medical education has been shifting to more active learning-type sessions such as flipped classrooms but these activities are unsuccessful when students do not complete the associated prework. The literature is lacking on why students do not complete prework and what would motivate them to do so. This qualitative study aims to answer those questions through the view of expectancy-value motivation theory.

METHODS: Thirteen preclinical medical students participated in a semistructured basic interview study investigating their experience with prework. Interview transcripts were coded, and codes were clustered and analyzed for themes.

RESULTS: Students develop particular routines they find successful for their studies. They explain how time in their schedules and the amount of time prework takes to complete plays a role in their study environment which must be favorable in order to complete prework. Students view video prework more favorably compared to reading assignments. Students note how the opinions of their peers influence their decision to complete prework. Each of these factors influences student motivation to complete prework.

CONCLUSION: This study finds that motivation to complete prework is influenced by the environment, format, and use of prework, student interest and prior knowledge, and peer influence. The combination of these factors determines whether a student believes they are capable of completing prework and if they find it valuable. In order to increase motivation to complete prework, faculty should consider how to address these factors in a way that students are able to fit prework into their study routines. This study provides the first step in understanding the medical student experience with prework and suggests directions for future studies to maximize student motivation to complete prework.

KEYWORDS: prework, motivation, expectancy-value theory, active learning

Introduction

Active learning reform has continued to move through different areas of education including medical education as the evidence of active learning success grows.[1,2] Prework is an essential part of creating effective active learning sessions.[3] Examples of these sessions include flipped classrooms, case-based sessions, and team-based learning.[3–6] Best practices for designing active learning sessions are well known; however, even with good session design, student learning is frequently not maximized because the required preparatory work, or prework, is not completed.[4,6–9] The current literature focuses on what happens in the classroom during the session and largely ignores the design of effective preparatory work and the motivation students require to complete it. This study seeks to advance our understanding of why medical students do not complete prework. It is a first step to inform future studies regarding prework. The findings will help faculty design a comprehensive experience that begins with student-completed prework, and, combined with what is already known regarding the various active learning techniques, maximize student engagement and learning.

Literature on prework

The literature identifies different types of prework including reading, guided reading or worksheets, and recordings or videos.[4] Studies have demonstrated that the addition of prework can benefit student performance.[4,10] However, little is known about the comparative effectiveness of different types of prework or how to best implement it. Student perception of prework is often noted as important, but the literature does not address why students do not complete prework or what would motivate them to do so. Techniques such as wonder questions, reading guides, consistency of implementation, videos, and scaffolding have been suggested to motivate students' completion of prework but implementation specifics are lacking.[5,8,11–14] Most of the literature about prework was identified in undergraduate science education, nursing education, and pharmaceutical education; only one study was

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identified in medical education at the time of this research.[4,8–12] This study was a perspective article describing innovations in medical education, including the formation of Khan Academy, a video resource that has impacted medical education with its popular use as prework for the flipped classroom model but no information on the use of this prework was included.[11] The medical education literature does include numerous studies on active learning sessions focusing on classroom activity with only brief statements about prework that describe what was assigned and some reporting statistics on whether it was completed.[3,5,15,16]

The delivery of medical education is currently shifting to more active learning with the goal of helping students reach higher-order thinking and create more learner-centeredness.[11] Where these sessions are unsuccessful, educators report that students do not complete the preparatory assignment and lose time for their planned active learning in order to review concepts.[4,6–9] Studies on problem-based learning describe that lack of preparation by students can lead to a lack of group discussion resulting in the inability to obtain learning goals for that session and associate lack of preparation with decreased attendance for those sessions.[6,17,18] To help understand students' impetus to complete prework, we turn to the literature on motivation.

Theories of motivation

There is a plethora of literature linking student motivation to learning in both general and medical education settings.[19] Commonly cited theories of motivation include self-determination theory, social-cognitive theory, attribution theory, goal-orientation theory, and expectancy-value theory (EVT).[20–25] Each of these theories will be reviewed briefly and can be used to explain different aspects of motivation in medical education when investigating different education goals.

When examining each theory, the authors looked for a theory that would help them understand both intrinsic and extrinsic factors that would either motivate or inhibit a student in completing prework while also investigating if students find value in prework. With self-determination theory, the learner's autonomy drives their motivation to learn.[23] This implies that students are completely self-motivated without the influence of extrinsic factors. This theory excludes a main part of the authors' investigation into identifying extrinsic factors that influence students' completion of prework and does not address whether a student finds value in the prework. Social-cognitive theory explains that motivation relies on personal beliefs and external influences to determine whether one is capable of completing the task.[19,26] This theory allows us to examine external influences that affect the completion of prework but does not provide information on whether students find value in prework. With attribution theory, motivation is driven by how the student feels about a task after an event has taken place to drive further action.[22] This theory could explain why a student would change their

behavior towards completing prework but does not encompass all factors of what would motivate or inhibit a student from completing the assignment. Goal-orientation theory can be divided into 3 main focuses: (1) mastery goal, in which students are motivated to master content; (2) performance-approach goal, where students are competitively driven and want to do better than their peers; and (3) performance-avoidance goal which explains that motivation is driven by the student's need to avoid failure.[19,27,28] This theory addresses the intrinsic motivation students have to complete assignments and could explain that students find the prework valuable in order to meet those 3 goals but does not take into account the extrinsic factors that influence whether a student is capable of completion of prework. In EVT, motivation is driven by the fact that the student believes they are capable and will be successful in completing the task balanced with the value the student finds in the task.[20] This theory takes into account the intrinsic and extrinsic factors that may affect the successful completion of the task along with what the student finds valuable.

This study seeks to determine what influences students' expectations of their ability to complete prework, what they value about prework, and if that value is enough to motivate them to complete prework. EVT best fits this investigation of the goal-directed behavior of completing prework. Although many theories in motivation are available, the subjective value and expectations of successful completion are core concepts in motivation to learn.[29] Expectancies and values directly influence motivation which leads to goal-directed behavior. The goal-directed behavior then supports learning and performance and leads to successful active learning.

Materials and methods
Study design

A pragmatic worldview was used to understand the medical student experience with prework to determine what they thought and how they used prework.[30] Consistent with this, data was collected through a basic semistructured interview study with first- and second-year medical students.[31] A qualitative approach was chosen to fully understand what factors influenced students' decisions to complete or not complete prework and to understand what they found beneficial or not beneficial. This study was determined to be exempt from the George Washington University Institutional Review Board (IRB). Participants were provided an informed consent document but signatures were waived by the IRB. First- and second-year medical students were asked to volunteer to complete a semistructured individual interview between February and March of 2022.

Context

The preclinical medical program curriculum is integrated so that students complete basic science and clinical medicine

topics related to a course theme or organ system in each course. Students receive different types of assignments, including prework, from faculty who may teach once or twice in a single course or from faculty who teach regularly throughout the entire curriculum. Thus, students may be familiar with a particular faculty member or have no experience with them prior to their session. The first-year medical students interviewed completed 7 months of the curriculum at the time of the interview and have received assignments from numerous faculties at this point. Specifically, the first-year students have experienced courses in the basic sciences, clinical-focused courses, and health populations courses. The courses encompass different formats of sessions including traditional lectures, case-based sessions, small group discussions, patient panel discussions, lab-based sessions, and simulation sessions. The second-year medical students have completed all of their preclinical curriculum at the time of interview which encompasses the same types of session listed for the first-year students but extends to 7 basic science courses, 3 clinical-focused courses, and 3 health populations-focused courses. Both the first- and second-year medical students have experienced various forms of prework at this point including videos recorded by faculty, videos from external recourses, textbook chapters, scientific articles, and asked to fill out charts using a particular resource. Students were recruited through email to their entire classes for volunteer interviews.

Data collection

Emails were sent to the entire first- and second-year medical student classes asking if they wanted to participate in this study. Thirteen students agreed to participate. Five participants were first year and 8 participants were second-year medical students.

A semistructured interview guide was designed based on EVT and included questions regarding student experience with completing or reasons for not completing preparatory work (Table 1). Interviews were audio and video recorded on Zoom and lasted up to 1 hour. All interviews were conducted by the first author who has extensive knowledge of the curriculum as a faculty member but was not teaching the students at the time of the interviews. All participants were informed that the objective of the interview was to better understand their experience with prework. No information regarding the literature review or the interviewer's opinion was shared in order to prevent any bias influence. Two pilot interviews were conducted and reviewed by the second author. No significant changes to the interview guide were suggested so both pilot interviews were included in the data analysis. Audio files were initially transcribed by Otter.ai software and reviewed for accuracy. All transcripts were de-identified prior to sharing with the second author. Videos were reviewed for any notable nonverbal information, however, none was noted and videos were deleted.

Member checks were completed by the participants; no edits were made.[32]

Data analysis

Transcripts were analyzed using open coding and constant comparative methods to identify themes.[33] First, transcripts were reviewed for initial coding impressions. The first author manually coded transcripts using Microsoft Excel and the second author reviewed coding. After each interview was coded, any new codes were applied to previously coded interviews until all coding was exhausted which occurred by the eighth transcript closely reviewed. This indicates saturation was met and enough data has been collected to draw conclusions.[34,35] Codes were then reviewed and grouped into clusters and themes were identified by both authors along with supporting quotes.

Reflexivity

Throughout the research process, the first author who completed the interviews, recognized any biases based on past experiences as a former student and as an instructor who assigns prework. The interviewing author remained neutral during the interview process and did not impose any opinionated responses to interview question answers. Neutrality was addressed by the lead author through journaling throughout the process along with the action of the second author to review the first 2 transcripts for any leading questions or bias. The second author also reviewed coding, clustering of codes, and themes to ensure all findings were supported by the data. At the time of the interviews, the interviewing author had completed working with the second-year medical students. The first-year medical students would continue working with the interviewing author in an academic capacity, however, grades were determined through exam software, and exam statistic reports were de-identified.

Results

Students define prework as "resources to familiarize yourself or oneself with the content that's going to be reviewed more in-depth in the class session" (Person (P)9, Med year (M) 2). They describe the purpose as "…to make sure everyone comes in with a working knowledge so the time can be better spent addressing questions and mistakes, applying the maneuvers versus teaching the maneuvers outright" (P7, M1). However, some consider it "…busy work" (P8, M1).

Four major themes were identified pertaining to the medical students' experiences with prework: (i) students have preclass routines; (ii) the environment impacts students' ability to complete prework; (iii) format and use determine whether prework is completed; and (iv) the topic, students' prior knowledge and peer opinion influence the attention to prework.

Table 1. Interview questions.

	INTERVIEW QUESTIONS
1	Tell me about where you are in your medical school experience currently.
2a	Is medical school what you expected so far? Can you expand on that?
2b	Can you explain?
3	Do you find any areas particularly difficult?
4a	Is the overall workload what you expected?
4b	Can you explain?
5	What do you typically do after a session or lecture?
6	What do you typically do before a session or lecture?
7	What do you call the work you do prior to a session or lecture?
8	How would you define prework?
9	When it comes to assigned prework, would you never, sometimes, or always complete it?
10	When do you typically complete prework?
11a	With assigned prework, how do you decide if you will complete it?
11b	What factors affect whether you will complete all of it?
12a	Has there been a time where you intended to complete the prework but did not complete it?
12b	If yes, can you explain why?
13a	Has there been a time after a session you decided to go back after the class and complete the prework?
13b	If yes, why?
14a	Have you changed the way you approach prework since you started medical school?
14b	If so, how?
14c	What caused this change?
15a	Tell me about a time that you were assigned prework that was helpful?
15b	Do you have another example from a different point in the curriculum?
16a	Tell me about a time that you were assigned prework that was not helpful?
16b	Do you have another example from a different point in the curriculum?
17a	Have you ever started a prework assignment and thought it was impossible to complete?
17b	If yes, why?
18	When it comes to different types of prework, what do you consider too long?
	The next few questions ask about prework for specific types of sessions:
19a	Is there a type of prework that you feel works best prior to a typical lecture?
19b	Is there a type of prework that you feel works best prior to a typical laboratory session?
19c	Is there a type of prework that you feel works best prior to a small group discussion session?
20	If you were advising the school on the topic of prework what would you say?
21	If you were advising a new medical student, what would you say about prework?
22	M2 only: When reflecting on your experiences with prework, how do you think you will approach prework during your upcoming clinical rotations?

(i) Students have preclass routines

Students establish their own individualized routines to prepare for sessions which can include reviewing slides, setting up note documents, and/or reviewing outside resources. One explained:

> Before a session, I would go to my running Google Doc, take a look at the slides … provided as long as they're up[loaded] … identify how dense the material will be … put a table[together] if I think it would be helpful. During the session, I can just fill out the table versus trying to make something organized while the professor's speaking (P11, M2).

Students complete their routine in conjunction with faculty-assigned prework (book chapters, research articles, PowerPoint slides, and videos) or replace faculty-assigned prework with external resources:

> If I saw a 23-page article … I would either try to find something else, or go through the slide deck instead so I still felt prepared for class (P2, M2).

(ii) The environment impacts students' ability to complete prework

Environmental factors impacting prework completion include schedules, workload, extracurricular activities, and personal obligations. Students indicated different times they prefer to complete the prework—the beginning of the week or right before the session, with some changing over the course of a semester:

> I used to complete it when I would plan out my week. Then I would get to the session and I wouldn't really remember what the prework was. I started taking more of a night before day before approach [so] that it's fresh in my mind (P10, M1).

Students' amount of time for prework was dependent on how much was assigned each day, the length of each assignment, and the amount of time available outside of class. Exemplar comments included:

> (1) …sometimes there was a lot happening in one or two days. And…four or five of hour lectures (videos) to get through the night before (P13, M2).

> (2) … [if] it's an hour long prework, I might just not watch it (P7, M1).

> (3) I didn't have enough time to get to it. I definitely took prework less seriously as time went on (P1, M2).

Extracurricular activities such as research or personal obligations including parenting are prioritized over prework. The culmination of environmental factors influences the student's mental capacity to complete the prework:

> …just being burned out and most of [the prework] would be mental hindrances to completing the prework (M2 5).

(iii) Format and use determine whether prework is completed

Students are more likely to complete prework that is labeled "required" and easy to locate in the course management system. Students prefer receiving a broad view of content over small details:

> Sometimes the prework you do ends up being highly detailed and the lecture itself ends up being more of an overview. And I don't like doing it that way, I find that having a broader understanding, and then focusing in on the more molecular aspects is much more conducive towards understanding (P6, M2).

Students express a strong preference for short videos over reading assignments. When discussing videos, they appreciate the ability to pause, speed up, or just listen while doing other tasks.

> I like videos to watch and someone explain it, as opposed to me reading it on my own. I tend to get headaches if I'm reading too much (P4, M1).

Reading assignments mentioned included textbooks and research articles. Students explained that reading assignments took them longer to complete than videos and that reading was not their preferred method of learning.

> …reading comprehension for me is one of my weak points, I'm not a good learner, by reading (P5, M2).

Accessibility and ease of use of prework is important. Students explained if a textbook is not freely available, they will not purchase it and prefer to be handed a printed article rather than read from a screen. They also want guidance:

> I'm not going to read this 20-page paper [and] not know what I'm supposed to get from it ahead of time because otherwise I don't know what to look for. And I'm just not going to retain 20 pages of information so, not really understanding what I needed to get from it was always a struggle (P11, M2).

Finally, how faculty use prework and whether they hold students accountable is influential to the completion of prework.

> I felt like sometimes we would watch this, 45-minute pre-lecture. And then we'd go to the lecture, and they give the same lecture (P13, M2).

> if it [was] a case-based session, I would then be more inclined to do the prework …I would need to have that knowledge ahead of time if I was going to have a productive class (P9, M2).

Students expressed that they did find value in some of the prework but how it was used was influential to their motivation.

> I think there's a place for it, but I think that it's just not being utilized by every instructor to the best of in the best way (P3, M1).

(iv) The topic, students' prior knowledge and peer opinion influence the attention to prework

Interest in the topic and whether students feel it is important for their education increases the likelihood of completing prework:

> I definitely felt … this was testable material. And … very applicable to real life and how we would manage patients…So I'm actually very glad that I read this article before coming to class (P13, M2).

Having prior knowledge on a topic decreases a student's likelihood of completing prework:

> Sometimes the prework was so broad, you'd get about halfway through it and [say], not doing this I'm because I have some physiology, pathology and anatomy background with nursing. It was all just basic review for me (P5, M2).

Peer opinion also influences the decision whether to complete prework:

> If someone puts up that really long video or article, amongst our peers we will joke about it; I can't believe they did that. On the other hand, sometimes there is highly recommended prework, that would definitely influenced me to do it. And if I did it, and [it] was good. I would then tell my friends, you should do this (P3, M1).

> …for small group stuff, there was a little bit less motivation to do prework just because almost inevitably, several people would [say] Oh, I didn't even look at that, what are we doing? And it would just be really frustrating (P1, M2).

Discussion

Findings in this study advance our knowledge about how students think about and what motivates them to complete prework while also confirming what we know in the literature about student study habits. This study found that student motivation to complete prework is influenced by students' routines, their environment, the format of the prework, their interests and prior knowledge, and peer opinion.

While the preferred video format was not surprising, students explained that reading assignments meant too much screen time. This was unexpected because watching videos also requires screen time. We know students take advantage of speeding up videos which may result in less screen time compared to some reading assignments. Also, this may indicate that students actually prefer the audio part of the video. They may not be looking at the screen which would be required in a reading assignment. Analyzing elements such as length of video, ability to interact with the video, cartoon versus person presenting images, what makes a good quality video, and comparing video to audio with different types of content is a future direction to better understand what students value about video prework.

Another surprising finding was how peers were able to influence the completion of prework. With the availability of mass messaging systems, students can share their opinions to an entire class within seconds. Another way peers influence completion in this particular curriculum is they often have small group sessions with the same people each time. Students learn the behavior of their peers and are able to predict if group members are unlikely to complete prework. When the group does not do the work, faculty are forced to go over everything during the session, making completion of the prework pointless. Students explained that when faculty repeat the prework, they realized it is not necessary to complete it.

A factor of the student environment to consider is their complicated schedules. If prework is not available when students have set aside that dedicated time, students will not complete it. It's also important to look at how many sessions in a week require prework, the total amount of time needed for prework and consider students need time for review along with other professional and personal activities. Students talked about the requirement of mental capacity in order to complete prework. Cognitive Load Theory explains the ability and capacity to learn and studies demonstrate that motivation can increase cognitive load.[36–38] Future studies are needed to analyze specific techniques to increase motivation and determine if students' mental capacity for prework is increased.

Participants in this study overwhelmingly stated that they were not motivated to complete reading assignments and
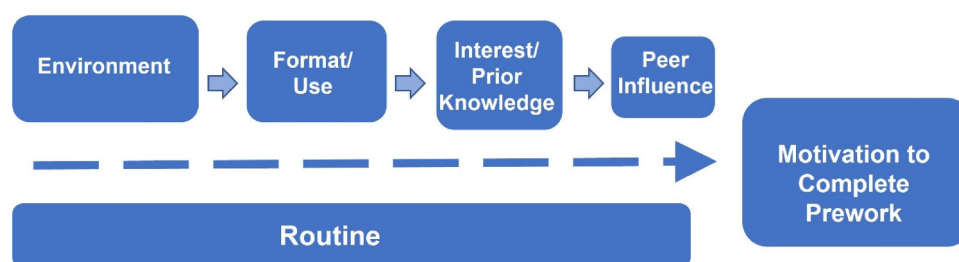

Figure 1. Each of these elements in order of importance influences motivation to complete prework. An environment resulting in the capability to complete prework, preferred format and proper use, interest in the topic with lack of prior knowledge, and positive peer opinion while fitting into the student's routine all increase the motivation to complete prework.

would replace them with other resources including videos. One main factor was that students felt they were poor readers, especially when it came to scientific articles. Students' feelings towards reading may not be surprising when considering their experience with reading and video content. The literature identified discussing students' completion of reading assignments comes from the areas of undergraduate studies in psychology, biology, and physics where these studies found the majority of students did not complete reading assignments and that the majority of students read their course textbooks < 3 h per week, even when more is assigned.[8,39–41] Authors were unable to find studies looking at the amount of reading completed specific to medical students. Students who are currently in medical school are known as digital natives, students who have grown up with technology and more interactive ways to learn.[42] As of 2001, the average college graduate has spent < 5000 h of their life reading but over 10,000 h watching video games and twice that amount watching television. Many medical education resources now include videos. A Google search completed on July 25, 2023, for "medical education resource videos" returned 1,840,000,000 results. Some are paid subscriptions but many are also freely available, making it extremely easy for students to replace reading assignments with video materials to go along with their preference. Future studies are needed to determine what medical students need in order to help students understand how to read articles and build their confidence.

Multiple students also expressed that being held accountable may help improve their motivation to complete prework. This could mean that expectations are set early and faculty do not just review the prework material or students suggest some sort of graded assessment. This brings the question of what

Checklist for Encouraging Students to Complete Prework:

Before Assigning Prework:
- ✓ Consider the student's schedule and what is expected of them in the time frame of interest such as exams, presentations and required homework.
- ✓ Consider how much prework in all concurrent courses may be assigned that week and how much time a student may be expected to spend on each assignment or preparing for specific sessions.
- ✓ Be aware that other activities whether personal or professional may outweigh prework due to what the student perceives as valuable.
- ✓ Consider what type of prework would be most useful for your session (ex: preparatory questions from a particular resource, outlines, short handouts or tables to review, guided reading, videos, interactive graphics).
- ✓ Ask yourself if the prework is necessary to reach the learning objectives.

When Creating/Assigning Prework:
- ✓ Prework should build a base that the following active learning session builds off of, misuse and heavily detailed prework content will easily lead to lack of motivation to complete the prework.
- ✓ If assigning some type of reading, provide clear learning objectives and guided questions to help the student focus on what they should learn from the material.
- ✓ Provide clear expectations for the prework assignment including whether it is required for the following active learning session. You may need to address with the students that your expectations differ from other faculty when it comes to accountability of prework.
- ✓ Make sure prework is available at least a week in advance with proper messaging to the students so they can fit it into their schedules.
- ✓ Make sure the material is easily accessible to all students. In addition, you may want to check your institution's accessibility policies.

During the Active Learning Session:
- ✓ Review the main points of the prework to address any confusion but avoid giving the same information during the following active learning session.

Figure 2. This figure provides suggestions to help increase motivation to complete prework. The list includes factors to consider before creating the prework assignment, factors to consider while creating and assigning the prework, and a factor to consider for follow-up to the prework during the active learning session. Please note these suggestions have not been analyzed through designed experimentation and are purely based on student interview comments.

do medical students consider a meaningful assessment. The AAMC reported that for the 2021-2022 academic year, 129 medical schools reported they have a pass-fail grading system and only 18 schools have a pass-fail with either honors or high-honors system.[43] This leads to the question, in a pass-fail system, will assessments like low-stake quizzes be valuable in student opinion? Future studies could help determine what ways students could be held accountable in order to increase motivation to complete prework. When the second-year students were asked whether their approach to prework would change now they are entering the clinical phase, all students said yes, explaining they believe they will be held accountable based on what they have heard about clinical rotations from their peers. Future studies to determine if prework is completed more often in clinical phases of medical school and comparing the use of prework in preclinical and clinical phases of medical school could provide insight into increasing student motivation.

Students use these factors of routine, environment, format, prior knowledge, and peer opinion to determine if the prework will be beneficial and if they are able to complete it which is in support of the Expectancy-Value Theory of motivation. Each of these factors is weighted differently and must be fulfilled in a way that meets students' expectations in order for them to value prework and therefore, be motivated to complete it (Figure 1). Figure 1 demonstrates, in order of importance, the factors that influence students' motivation to complete prework while keeping in mind that the prework must also fit into students' routines. Students highly emphasized details affecting their environment, followed by format and use of prework. Their interest in a topic, prior knowledge, and peer influence are also considered by students but have less of an impact on their decision to complete prework. Figure 2 provides a checklist of suggestions to increase student motivation to complete prework based on the results of this study. This study makes an important contribution of information that was previously lacking in the literature providing an understanding of what factors contribute to students' decisions in completing prework. This study also suggests future studies to determine best practices of prework design that will motivate students to complete prework.

Limitations

This study focuses on students at a single institution so the experiences are specific to the prework found in that curriculum. There were no follow-up questions once the data was reviewed.

Conclusions

To motivate students to complete prework the following factors need to be considered along with student routine: environment; format and use of prework; student interest and prior knowledge; and peer influence. Using the information found in this study, instructors will be able to tailor assignments with the goal of having more students complete the prework. Accordingly, education can continue to transition to a more student-centered learning environment and help students become self-directed learners.

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