

Using a Study Journal to Support Class Engagement and the Development of Entrepreneurial Mindset Habits

Dr. Otilia Popescu, Old Dominion University

Dr. Otilia Popescu received the Engineering Diploma and M.S. degree from the Polytechnic Institute of Bucharest, Romania, and the PhD degree from Rutgers University, all in Electrical and Computer Engineering. Her research interests are in the general areas of communication systems, wireless communications, control theory, signal processing and engineering education. She is currently a Professor in the Department of Engineering Technology, at Old Dominion University in Norfolk, Virginia, and served for seven years as the Program Director for the Electrical Engineering Technology Program. In the past she has worked for the University of Texas at Dallas, University of Texas at San Antonio, Rutgers University, and Politehnica University of Bucharest. She is a senior member of the IEEE.

Dimitrie C Popescu, Old Dominion University

Dimitrie C. Popescu received the Engineering Diploma with specialization in Electrical and Computer Engineering from Polytechnic Institute of Bucharest, Romania, and the Ph.D. degree in Electrical and Computer Engineering from Rutgers University, New Brunswick, New Jersey. He is currently a Professor in the Department of Electrical and Computer Engineering, Old Dominion University, Norfolk, VA. His research interests are in the area of wireless communication systems and include software defined and cognitive radios, spectrum sensing and dynamic spectrum access for cognitive radios, modulation classification, interference mitigation and transmitter/receiver optimization to support quality of service, vehicular networks, and signal processing for communications and radar systems. Dr. Dimitrie Popescu has served as ONR Senior Faculty Research Fellow at Naval Surface Warfare Center Dahlgren, and has also held summer positions with AT&T Labs in Florham Park, NJ, and with Telcordia Technologies (formerly known as Bellcore) in Red Bank, NJ. He is an active Senior Member of the IEEE currently serving as an Associate Editor for IEEE Sensors Letters and participating regularly in the technical program and organizing committees for the IEEE International Conference on Communications (ICC), IEEE Global Telecommunications Conference (Globecom), IEEE Wireless Communications and Networking Conference (WCNC), and IEEE Vehicular Technologies Conference (VTC). He has also served as Associate Editor for IEEE Transactions on Wireless Communications, IEEE Communications Letters, and the IEEE Open Journal of the Communications Society.

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Engineering Technology (ET) programs were historically introduced to support non-traditional students and to offer college pathways for working students who are already developing a career. This is even more true in the current academic environment, where a large percentage of students enrolled in some ET programs are employed either full-time or part-time, including active military personnel and veterans, and who are at various stages in their lives, often with families to care for. Due to their schedule constraints, non-traditional students usually attend classes online, either synchronously or even more often asynchronously. The course instructors would introduce various course adjustments to accommodate students' schedule constraints, but with limited time allocated for a course, students may become disengaged or have lower performance due to poor time management. In this context, a Study Journal assignment was introduced in several courses within an Electrical Engineering Technology (EET) program. The goal of this assignment was to assist students with their time management for the course and to help them develop or improve their study habits. In addition, students were introduced to the concept of Entrepreneurial Mindset (EM) in the context of the study journal assignment, and to the key EM habits of Curiosity, Connections and Creating Value. Specifically, the study journal assignment required students to explore these EM habits in relation to the course materials and curriculum. With this assignment, students were strongly encouraged to reflect on their study habits, time management and the weight of the EM habits in their study work, and to use the journal as an instrument for self-assessment and improvement. The paper discusses the study journal assignment and the feedback on it received from the students.

Introduction

The history of Engineering Technology programs is interlaced with that of Engineering Programs, while newer and related to the more hands-on, applied aspects of engineering. The literature related to the history of the programs [1-6] talks about the programs being introduced in the mid 1960's and about the challenges encountered by the programs over time, differences and similarities with the engineering programs, and about many graduates becoming also professional engineers, but talks less about the composition of the student body in these programs. Many of the ET programs across the nation may follow a history similar to the programs at Old Dominion University, which were introduced in 1971 as 4-year baccalaureate programs while prior associate degrees were phasing out after about 30 years of practice. However, the newly introduced BS degree programs were heavily relying on transfer students with associate degrees from the community colleges within the state, and lately from across the country. At Old Dominion University (ODU), another large group of the student population consisted of students with military background, who may have joined the program without an associate degree while still transferring most of the lower division part of the curriculum, using courses completed as part of their military training or through associated community college programs. As a result, the student population in the engineering technology programs at ODU was composed by more than 50% of non-traditional students, joining the program in the upper level of the curriculum to complete their BS degrees. For example, in fall 2022 about 38% of the EET students at ODU had joined the program with an associate degree, and

in fall 2025 close to 60% of the students were military affiliated, which translates into the fact that the majority of students in the EET program were non-traditional students. Here, the term non-traditional students refers to students not coming into the program directly from high school, but rather through transfers from a different educational program, such as community college associate degrees or military programs. Often, these students join a BS degree after having spent years working in the field, which means they bring a lot of practical expertise, but they may have long periods of being out of school across their academic career. They are typically older than traditional students, and most of the time have family responsibilities on top of their full/part-time jobs at the time they add the school commitments to their schedule. As a result, most of these students choose an online setting for completing their BS degrees. In [7] the history of the online delivery in the EET program at Old Dominion University is presented, along with the shift in the student body from mostly campus students to mostly online students. It was also noted [8] that this group of students often brings maturity to their approach to studying and their performance in the class is at the same level and sometimes better than that of campus students. Different settings were used to accommodate the online students, including synchronous, asynchronous, and hybrid scenarios. Currently, the trend at ODU is towards asynchronous settings, due to the schedule of the students working either full or part-time interfering with the timing of the course delivery.

There is limited literature regarding the use of a journal in engineering courses, with most of the published papers referring to project-related journals or writing within the discipline, rather than using the journal as an engagement tool, as is the case presented in this paper. However, more literature can be found related to “reflection journals” [9-11] and the use of reflection and self-reflection in engineering education. Alternatively, the reflection component may be considered within an engineering portfolio item and used for various assessments of student learning outcomes [12]. Some other researchers investigated the time students allocate to their engineering studies and raised the alarm of students using decreasing study time for their courses, while asking what factors influence student time use and the learning approaches [13]. The allocation of the study time for a course is also one of the components of the study journal presented in this paper. There are also studies to investigate the relationship between reflection journals and retention [14-17], which showed that incorporating reflections in a course helps to improve students’ attitude in the class and makes them feel that their learning is better supported, with the end result of the studies being that student retention was increased. The positive results mentioned in the literature due to using reflection journals for time management and retention, were also in line with the results observed from the use of the “study journal” presented in this case study.

Motivation

The motivation for introducing a study journal in some EET courses at this time was to increase course engagement and to enhance the critical thinking component of the learning process. The goal was to help students develop a tool for self-assessment of their use of study time, and to help them develop more engaging study habits, rooted in critical thinking of the study material.

The research questions that motivated the introduction of this instrument were:

Q1 - Would self-monitoring the allocation of study time for a course improve time management and class performance?

Q2 - Would critical thinking centered around the EM habits help to improve students' engagement in the class?

As mentioned in the previous section, the composition of the student body in the EET program at ODU shifted in the last decade to the majority of students attending the courses online. To assist this student population, the course delivery was mainly online synchronous (students attend the classes live but remotely) or hybrid (a mix of campus and online students attending the same course live), with only a few courses set for asynchronous delivery. These options were very much appreciated by the students as they valued the opportunity to attend live and be able to ask questions in real time, and at the same time having the chance to meet and interact with their classmates too. The fact that both campus and online students were exposed to the same course delivery and the same expectations was also very much appreciated by the students in the hybrid courses. However, the synchronous or hybrid courses only solve the distance issue, helping those students who are not on campus or within commuting distance, or do not have the time for commuting. They do not solve the timing issue of the working students. With over 70% of the students in the class working at least part time, including some military students being located in different time zones than the main campus, a large percentage of the students had a hard time to accommodate the timing of the lectures and were requesting approval to participate in the course in an asynchronous mode, even though the course was not set as such. With so much variety and constraints coming from the students' schedule, it is hard to find a good time for a live delivery of the course to accommodate everybody, so faculty in the EET program at ODU typically allow students to attend asynchronously, as long as they document their time conflict and commit to making the same deadlines as the rest of the class. The instructors assist the students in these situations by having very flexible methods of responding to their questions, either by emails or one-to-one Zoom meetings as office hours. While the instructors make a lot of effort to accommodate the students for their scheduling constraints, it was noted that students' participation in the class and the time allocated for studying started to be negatively affected. Lately, instructors have been providing a lot of study materials for their courses, including recorded lectures, detailed lecture notes, chapter summaries, samples of solved problems and probably many other types of materials. While all of these are very good study materials and assist various student needs, a question that comes up is whether the learning process is really improved, or if providing so many materials leads to students having limited input in developing their own study materials and growing their learning from the basic background provided by a course. But this would be a question for a different study. With less time available for studying, but with plenty and alternative study materials provided, often students may cut short on the time they invest in watching the lecture recordings, maybe skipping through these recordings, and may only browse or skip completely the lecture notes and textbooks jumping directly to the problem solving required by the homework assignments, without making sure they have a clear understanding of the concepts before attempting the assignments. It turns out this is a matter of student engagement in the class,

but it is very hard to achieve the engagement when students are not attending the course live, and they mostly participate in an asynchronous manner. This was the main reason for introducing a study journal in several of the EET courses, starting in Fall 2024. In the initial format, the assignment was mostly set to track the time the students allocate for the course, with the goal of making the journal an actual tool for time management and to assist the students to stay on track with the course material. Since Fall 2025, the assignment was redesigned to integrate a critical thinking component of the learning process, centered around the key Entrepreneurial Mindset (EM) habits of Curiosity, Connections and Creating Value, or the 3C's [18]. While some students found value in keeping a time record of their study to assist with time management, the addition of the EM components turned the journal into a more valuable tool, with most of the students appreciating its benefits and enjoying it better. This addition sparked students' interest and made them more aware of the importance of how they study, and the effectiveness of their study time.

Study Journal Assignment Settings

Being a journal, this assignment assumes that it will be completed over the full semester and is expected to be used as a companion for the learning process in the course. Students are introduced to the assignment from the very first meeting of the course, and they are also provided with a detailed assignment document, which defines the goals of the assignment, the items required for completion, suggestions for formatting the report, as well as clear descriptions of the three EM habits. A progress report is required within a few weeks of the semester, as a complete/incomplete assignment, for the instructor to have the chance to give some feedback on how the journal is structured, or to bring clarifications if the directions were not followed. The final report is due at the end of the semester and is counted as a regular homework assignment for grading. It must be noted that the courses covered by this study were all delivered using the online synchronous mode, and the statement about attendance in the journal was required because a large number of students were asking for asynchronous attendance.

The following items are required for the final report:

- *A statement* that the syllabus was reviewed and all the requirements understood. The eventual questions on the syllabus may be noted in the journal while also sent to the instructor for a timely response.
- *A statement* about class attendance. If there is a schedule conflict, some documentation of it must be included here. This may be a simple note from the work supervisor about the working hours.
- *A paragraph* discussing study habits. This may be anything that students find relevant about how they study or what type of materials they use for the class. This is a reflection paragraph, and it is expected to help the students to think of the way they approach their studying process and eventually, by the end of the course, decide on some changes to use the studying time in a more efficient way. This reflection is expected to be made at the very beginning of the semester and should reflect the study habits previously developed.
- The lengthiest entry in the journal is *a record of the time allocated for the class*. For simplicity, it is suggested to use either a list or a table to record the date, the activity (lecture, homework, or studying), and the amount of time allocated. This may seem tedious, but it should take little

time if the document is kept along with any course activity, and brief notes are taken each time. Alternatively, students may record weekly averages for each type of activity. In addition, for each lecture, students are asked to include in this list either a question or a comment based on the material presented in that lecture. For these entries, the key entrepreneurial mindset habits may be used as a guide. For clarity, the assignment document includes a short section with more explanations about EM habits. A list of questions is also suggested for students to keep in mind when reviewing course materials, and they are also encouraged to develop their own set of questions as reference. Few of such questions are: What do I find interesting? Why? How/where will this be applied? What concept made me curious? What would I like to investigate further? What is the connection between the concepts presented today, or how they relate with something else I learned?

- The last component of the assignment is a *reflection paragraph* about the journal assignment. Students are asked to talk about how/if this assignment helped them to develop better time management for their study time, or to be better organized in their study work. The reflection should also refer to how the brief comments/questions on each lecture helped them to develop a more critical thinking of the course material, and if the entrepreneurial mindset habits (curiosity, connections, and creating value) contributed to a better perspective on the study material. This reflection is to be made at the end of the semester and any eventual changes in the study habits as a result of this assignment may be noted here.

A sample record table suggested for tracking the allocation of the study time is shown here:

Week #: From Date – To Date			
date	time	activity	comments
xx/xx	75 min	lecture	Question: ... Comment: ...
xx/xx	30 min	Review time	
xx/xx	75 min	lecture	Question: ... Comment: ...
xx/xx	60 min	homework	

The goal of this assignment is mainly for the students to develop a study tool of their own, for them to adjust the record/journal to their needs and use it to learn what they need to improve in their time management, as well as keeping track of the things they learn and what sparks their curiosity. The journal should become a tool to help with developing study habits. As the entrepreneur Jim Rohn once said, “motivation is what gets you started, habit is what keeps you going”. As part of life-long learning, the development of good study habits is very important for the success of every student.

It is also important to note that students are not graded or evaluated on the actual data they introduce in the report, the amount of time used, or the comments they make. They are graded for completing the process. Because of this, students should be confident and honest in how they keep their record, since the actual data is only relevant to themselves for self-evaluation and for decision making about eventual changes in their own study habits. Thus, self-reporting time data should not affect the results of this study, which are presented in the next section.

Course Assessment Results

The study journal assignment started to be deployed in Fall 2024, with the EM habits component being added in Fall 2025. The assignment was used in two electrical circuits courses, a 200-level and a 300-level course, in a 300-level advanced technical analysis course, in a 300-level communication systems course and in a 400-level elective course on wireless communication systems, a total of 5 courses. On average, about 20 to 30 students were impacted by each course. It is hard to do a quantitative assessment of how this assignment helped to improve either retention or performance in the class, and this is mostly because there is no reference group for comparison. The ABET course assessment from semester to semester may be compared, but there are many variables involved in the assessment process and it is not a direct way to clearly separate the effects of one specific instrument. Especially for retention, there is no clear indication that the journal had any influence, typically course withdrawals being affected by personal reasons. The way course engagement and time management were affected by the journal assignment is mostly evaluated through students' comments. Since the students' feedback was mostly positive, this may be an indirect way to link the journal assignment to the class performance. It is also noted that the assessment of the course objectives and ABET Student Outcomes (SO) showed improvement after the introduction for the study journal. For example, the assessment results of ABET SO1 (*an ability to apply knowledge, techniques, skills and modern tools of mathematics, science, engineering, and technology to solve broadly defined engineering problems appropriate to the discipline*) in the 300-level circuits course and the 400-level wireless communications course is shown in the table below.

Course	Fall 2023		Fall 2024		Fall 2025	
	score (%)	# of students	score (%)	# of students	score (%)	# of students
3xx	72.7%	11	86.7%	15	91.7%	24
4xx	77.8%	18	95.2%	21	95.8%	24

For these assessment results the numbers in the table indicate the percentages, as well as the number of students, scoring in the meeting and exceeding expectations for the corresponding outcome. In fall 2023 the journal assignment was not introduced yet. It was introduced in fall 2024 in its first format, tracking only the use of study time, and in fall 2025 the critical thinking component with EM habits was added. Both courses show assessment improvements when the journal was introduced. How much these improvements are due to the journal assignment is hard to estimate, but the data, correlated with students' feedback, may imply a strong connection. Another consideration for correlating the addition of the journal with the performance improvements is that no other major changes were made in the courses, and the instruments for ABET assessment were not modified over the period analyzed. There are three tests administrated in the 300-level course and two tests and a term project in the 400-level elective course. For assessment, mostly the problem solving from the tests was used, and the structure of the tests and the way the assessment was performed did not change for the time period evaluated in this study. It may be inferred that even though the journal was not directly used as an assessment instrument, it had indirectly affected the assessment, since this was the main modification added to the courses.

Students' Feedback on the Study Journal Assignment

The feedback from the students is evaluated mostly from qualitative perspective, based on the reflection paragraph included in their reports, and in relation to the research questions. In the first version of the journal assignment, which focused mostly on time management, most students found the assignment helpful, giving them some insights on their own way of using the time, but about 20% of the students only found the assignment to be extra work and did not value it much in that initial format. There were students saying that even though they do not think the assignment helped them to improve the course performance, they still see value in it and understand how it could help. However, once the critical thinking component was added, with this component framed along with the entrepreneurial mindset, students' interest very much improved, they did not find the assignment boring or tedious, and they considered that it was indeed a valuable tool which helped them to improve their study habits. In Fall 2025 semester, out of close to 50 students that were completing the assignment in two courses (one on electrical circuits and the other on wireless communication systems), only one student claimed to not find this assignment beneficial and considered it just another homework assignment. About 15% of the students missed the final reflection paragraph in their submission and about 25% of them did not include critical thinking notes on the lectures but rather brief summaries of what was covered. One student suggested more progress reports to be required during the semester, for better feedback and to keep students on track.

A list of students' testimonies regarding the Study Journal assignment, collected in Fall 2025, is included below. The students' comments are grouped along with the research questions they align. The first group positively answers both research questions, the second group focuses on time management and they were aligned with research question Q1, and the last group relates more to the second research question Q2, commenting more on the study habits and engagement. In the last group of comments students do not seem to think their performance was affected by developing this journal, while they still see how it can be beneficial.

- [Q1, Q2] - "Preparing and using this study journal helped me become more intentional about how I managed my study time and organized my work throughout this course. This made my study time more structured and prevented me from falling behind. Writing a question for almost every lecture forced me to think more critically about the material. This process also strengthened the entrepreneurial mindset habits emphasized in the course. [...] Overall, this assignment improved not only my understanding of the content but also my ability to approach learning in a more reflective way."
- [Q1, Q2] - "The journal became an important tool that helped me track my learning progress, organize my study sessions, and hold myself accountable. [...] Overall, this journal not only helped improve my time management and study habits, but it also changed the way I approached learning. Instead of just focusing on finishing work, I focused on understanding, connecting, and applying what I learned. This mindset helped me stay engaged, improve my performance, and see the purpose behind the work."
- [Q1, Q2] - "Writing a short question after reading each module pushed me to think a bit more deeply about the concepts rather than just passively watching the recordings. The focus on curiosity and making connections ultimately gave me a clearer view of the material. Overall,

the journal helped me manage my time better and stay more engaged with the course content in a simple yet effective way.”

- [Q1, Q2] - “Writing this journal has made me realize that I really need to improve my studying habits and my time management. The questions I wrote down for each lecture made me more interested in doing my own research on the topics. It also helped to tie together concepts from the lecture that I would have had difficulty understanding separately.”
- [Q1, Q2] - “I was able to use the Study Journal to help with the pacing of studying for my coursework. Keeping track of the lecture notes using questions made me to come into class with an open mindset and curiosity. Overall, the journal was a benefit to my learning experience, and I am likely to implement this journaling process in future classes.”
- [Q1, Q2] - “This assignment helped me develop better time management by creating a plan to spend the week studying and working on homework instead of doing it at the last minute. The comments helped me develop critical thinking by making me to rewatch the lectures and think about the topics. Also, the mindset habits contributed to improving my studying habits by pointing me to connect different topics.”
- [Q1, Q2] - “Filling out this journal really helped me to see where my time was used instead of just brushing it off with “I studied a lot.” Writing short comments or questions helped connect what we did in class with my own studying. The journal helped me stay organized and gave me a better sense of how everything in the course fits together.”

- [Q1] - “This journal proved to be very helpful in that it showed how much time I was really allocating to homework, which to me seemed like a lot, so I’m thinking that in the future I might have to take a more different approach when it comes to getting the help I need.”
- [Q1] - “After reflecting on my efforts this semester, I believe that keeping a journal held me accountable to my actions. I realize that I spend too much time trying to catch up with lectures rather than studying.”
- [Q1] - “I would say that this journal was successful in keeping me on track in this class. I think having this journal helped me stay on a day-to-day mindset.”
- [Q1] - “The journal report helped me keep up with the lectures. It allowed me not only to study better, but helped me build a routine for studying.”

- [Q2] - “I can see the value of this assignment if one is disciplined enough to maintain it. This type of assignment encourages critical/creative thinking which is the good aspect of it. I personally like this method of study, but it may be time consuming.”
- [Q2] - “I think this assignment is a good idea and could work very well for some people. For me, I’m not sure I would do it voluntarily. I don’t think that using the journal took anything away from my learning or took too much time, so I am glad I tried it out this semester.”
- [Q2] - “The journal is a helpful tool to keep track of my study habits more actively. Personally, I don’t think it made me perform better for the class. It was definitely more of a tool to help me stay accountable to myself. This type of thing I keep on my own at work. It’s a great tool and skill.”

It may seem as a lot of notes were included here, but the instructors found that the comments were very good in showing students’ attitude toward the study journal assignment, how it really helped

most of them to improve on time management and organization, and it also made the students to reflect on their own learning process and get more involved in the way they process new information and how they relate it to other knowledge. Students also pointed out the benefits of the assignment on keeping them more engaged in the class and in learning. Overall, the testimonials included here are in strong support of both research questions proposed. Additionally, correlating these testimonials with the course assessment results shown in the previous section leads to the conclusion that the study journal was indeed a good addition to the courses and helped the students to self-evaluate and improve their study habits.

The instructors plan to continue using this type of assignment in their classes. If students use it in a timely manner, with brief entries included when study work is performed, it should not add to the study time but is expected to add structure and efficiency to it. One aspect that the instructors would want to improve is to extend the critical thinking component from individual to group approach. A lot of the comments or questions that students included in their journals would be excellent starting points for group discussions in the class, but since these reports are due at the end of the semester it is too late to bring them up in class or on any discussion platform. One idea that will be considered in the future is to open a discussion board for the whole class, most probably through Canvas which is the course platform currently used, and have the students post some of their comments and questions as the course progresses, and to which classmates should be able to reply with their own comments. Another platform that offers a nice discussion setting and may be considered for future use is Padlet [19], which offers a nice social interaction platform, with all comments open to all participants. Alternatively, student questions recorded from previous semesters may be used as starting points for discussions. Based on experience, any discussion board introduced to the class must be also required for grading, as otherwise students may tend to ignore it.

Conclusions

The study journal presented in this paper was used in several courses in an EET program over the last several semesters. It started as a way to make sure students are on track with the lectures and the pace of the class, used as a time management tool, and it evolved as an engagement and critical thinking instrument too. The assignment was well received by the students, and with the addition of the critical thinking component through the entrepreneurial mindset lenses the students found it more valuable and appreciated the benefits of developing strong learning habits. The course assessment data correlated with students' testimonials demonstrate that the study journal was an efficient instrument for improving time management and engagement in the engineering classes.

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