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Exploring Advanced Placement Research Course: Student Perspectives, Advantages, and Obstacles

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Abstract

This study examines the efficacy, benefits, and concerns of high school students in the 2021-2022 AP Research course. It assesses their satisfaction with course materials and methods, utilizing surveys and essays for data collection. The findings reveal that, despite challenges, most students improved and were satisfied with the teacher's pedagogy. These results enhance our understanding of AP Research's effectiveness and impact on student engagement. Further research is required to optimize student experiences and outcomes in the program.

Keywords: AP research; High school students; Efficacy; Satisfaction; Course pedagogy.

1. Introduction

The Applied Technology High School (ATHS) introduced the Advanced Placement (AP) Capstone Diploma Program in 2018-2019, aiming to enhance students' analytical, research, problem-solving, and communication skills. This study evaluates the level of knowledge and skills acquired by students after completing the AP Research course, as well as their self-efficacy and concerns. Additionally, the study explores students' perceptions of teaching behaviors, course materials, pacing, resources, and assessment. Data were collected through a survey and reflective assignments.

The primary objective of this study is to assess the knowledge and skills acquired by students upon completion of the AP Research course. Additionally, the study aims to examine students' self-efficacy and identify any concerns related to the course. Furthermore, the study seeks to gain insights into students' evaluations of teaching behaviors, course materials, pacing, resources, and assessment. It is important to acknowledge that some students may feel unprepared or overwhelmed, while others may exhibit a lack of confidence and engagement during formative assessment tasks. These tasks are designed to assist students in skill development and meeting ATHS requirements.

To collect data and information, the researcher developed a survey and asked students to provide reflective responses on the course after submitting their required assignments. The survey includes questions related to knowledge acquisition, skill development, self-efficacy, and concerns. The reflective responses aim to elicit students' perspectives on teaching behaviors, course materials, pacing, resources, and assessment.

By examining the impact of the AP Research course on students' knowledge, skills, and perceptions, this study contributes to the ongoing efforts of ATHS to provide a high-quality education. The findings will inform future improvements in teaching practices, course materials, and assessment strategies, ensuring that students are well-prepared and supported throughout their academic journey.

1.1. About the AP Research Course

The AP Research course offers students an opportunity to apply and enhance their knowledge and skills acquired from the AP Seminar and other courses. This paper aims to provide an overview of the course and its assessment components.

The AP Research course encourages students to delve deeply into an academic topic, problem, issue, or idea of personal interest. It requires students to design, plan, and execute a yearlong investigation to address a research question. By engaging in this inquiry, students develop their research methodology skills, practice ethical research conduct, and master the process of accessing, analyzing, and synthesizing information. The culmination of the course involves the completion of an academic paper and a presentation, which includes an oral defense.

Assessment: Students' performance in the AP Research course is evaluated through a through-course performance task comprising of two distinct components. These components are summarized in Table 1 (see Appendix) and contribute to the calculation of the students' final AP scores.

Table-1, Components of the AP Research Performance Tasks

Component	Scoring Method	Weight
Academic Paper (4000- 5000 words)	College Board scored	75%
Presentation and Oral Défense **(POD)** (15-20 Mint)	Teacher scored	25%

The AP Research course requires students to write an original research paper that is 4000 – 5000 words in length. The paper should include an Introduction, Literature Review, Methodology, Results and Findings, Discussion, and Conclusion. While teachers and consultants (Academic Advisors) can provide guidance, the paper must be the student's own work. Students must submit their academic papers through their digital portfolio, which is developed and managed by the College Board. The College Board readers are responsible for scoring the students' submissions.

Once the Academic Paper is completed, students are required to deliver a final summative assessment in the form of a Presentation of their work and an Oral Defense (POD). The presentation should incorporate various media to support and enhance the student's report of key findings, description of the chosen approach, and challenges encountered. During the Oral Defense, the student will answer questions posed by a panel of three AP Research experts, including the AP Research teacher and the student's consultant(s). It is recommended that the presentation be limited to 15 minutes or less, allowing five minutes for the panel questions. The score for the POD will be determined by the certified course teacher, who is also responsible for entering the scores into the AP Digital portfolio platform.

The individual teachers are responsible for designing their own curriculum (syllabus), assignments, and resources for AP courses, just like other AP courses. Therefore, they must complete curricular training before teaching each course for the first time. Each year, all AP Research teachers are required to take and pass the Presentation and Oral Defense (POD) certification test in order to submit scores for this performance task component.

1.2. Context of the Study

AP Research is a mandatory course for Grade 12 students enrolled in the Advanced Science Program (ASP). It is the primary course in which research skills are taught and practiced at the ATHS. While the AP Seminar course, which serves as a prerequisite for AP Research, is introduced in Grade 11, an introductory AP Capstone course is locally developed and given to Grade 10 students. The English department is responsible for delivering the AP Capstone program, but no credit hours are granted for the English courses. A ninety-minute face-to-face block is allocated in the timetable for the AP Research course. During this block, the teacher meets with the students to explain the course requirements, assessment rubrics, important dates, and conduct tasks and activities to guide students in writing their paper and preparing for their presentation and oral defense. As previously mentioned, the scores from these two distinct components form the final AP Research score/band. However, students are also expected to complete teacher-planned tasks and activities, both in and out of class. These tasks may include documenting their experiences, continuously reflecting on their research process through the Process and Reflection Portfolio (PREP), writing an inquiry proposal for committee approval of their research project, doing a poster presentation about their project, and writing a course reflection essay. These tasks and activities are assessed using well-developed rubrics, and the scores from these teacher-planned tasks are calculated to form the formative assessment score for the course, which will be reflected in their school records. The assessment policy at ATHS does not permit using students' submissions to the College Board for their school-based formative assessment. Students have consistently expressed a need for a systematic change to the course so that its content aligns with the requirements and pacing of their other courses. In response to these concerns, formative assessment activities and tasks have been developed to include only tasks that help students complete the summative assessment assignments (academic paper and presentation).

The general structure of the course provided by the curriculum unit at the directorate has remained unchanged for the past two years since its introduction in 2019 for ATHS students. However, minor modifications have been made to some of the formative assessment tasks. Although the College Board offers some materials and suggestions through their platforms, this course was developed, coordinated, and delivered by the same teacher during this consecutive two-year period.

To enhance the research process for students, the instructor created a website that contains course materials, examples of previously released papers, tips for academic writing, and links to other relevant resources. Additionally, individual student folders were created on the One Drive platform, allowing for the submission and ongoing development of assignments as "living" documents. This approach enabled the instructor to monitor students' progress in real-time and from any device, thereby facilitating continuous dialogue and motivation. Furthermore, by incorporating weekly feedback through the use of PrEP, the lesson materials and delivery were adapted to meet the evolving needs and address the concerns of students. This level of support fostered a positive relationship between the instructor and students, resulting in increased confidence and proficiency in research skills. The course emphasizes skill development rather than knowledge recall; therefore, students were not required to take quizzes or tests, but rather to demonstrate their skills through the completion of course assignments. Despite this, there has been no formal evaluation of the course or measurement of student satisfaction and effectiveness.

1.3. Participants and Case Description

A total of 24 grade 12 students from the Advanced Science Program (ASP) were enrolled in the AP Research course at the ATHS-Ain campus. The gender distribution of the participants was 67% (N=16) female and 33% (N=8) male. While no formal data on the participants' proficiency levels was available beyond school records, it can be inferred that the students enrolled in the ASP stream possess high levels of proficiency and study skills, as admission to this program is typically limited to students who achieve an average score of 85 or higher in their school subjects. To provide context on the participants' proficiency levels, the researcher reviewed their academic performance in grade 11. The results indicated that the average scores of the participants ranged from 89.4% to 98.2%, placing them among the highest achieving students in the school.

1.4. Research Instruments

Two instruments were used to gather data and information on the quality of the AP research course and the perceptions of the students enrolled in it: a course evaluation questionnaire and an individual self-reflection essay.

1.5. Course Evaluation Questionnaire

To gain a comprehensive understanding of the AP research course and the experiences of the students enrolled in it, a two-pronged approach was employed. Firstly, a course evaluation questionnaire (Appendix A) was distributed to the students during the final week of the course once all submissions had been uploaded to the College Board digital portfolio. This questionnaire aimed to quantify and qualify students' satisfaction with the course and identify areas that require improvement. The questionnaire consisted of four demographic multiple-choice questions, 28 Likert-scale questions, eight multiple-choice questions, and two open-ended questions. The Likert-scale questions were categorized into four groups: Organization and Clarity (six items), Skills Learned (seven items), Delivery Climate (seven items), and Course Elements (eight items). To ensure the questionnaire's reliability, Cronbach's alpha was calculated on data from the 28 Likert-scale items. All questions had a five-level scale (strongly disagree, disagree, neutral, agree, strongly agree) for the first three categories, and (not very helpful, somewhat helpful, sufficiently helpful, extremely helpful, not applicable) for the last category. The questionnaire demonstrated internal consistency and reliability, with a Cronbach's alpha value of .77 for all groups. A Cronbach's alpha value above 0.70 is considered reliable according to Pallant (2001).

1.6. Course Reflection Essay

To gain a deeper understanding of students' perceptions of the course, a course reflection essay was employed as part of their formative assessment after the course had been completed. The participants were asked to reflect on the course and its impact on their learning, share any challenges they faced, suggest areas for improvement, and evaluate the teaching behaviors.

To ensure that students approached the course reflection essay in a structured and thoughtful manner, they were provided with a set of focused questions to guide their reflection. These questions were carefully designed to cover various aspects of the course, such as content, teaching methods, assignments, and overall learning outcomes. By providing this guidance, we aimed to encourage students to critically evaluate their learning experiences and provide valuable insights for course improvement.

Additionally, examples of well-written reflection essays were discussed with the students. This exercise aimed to clarify the expectations and help students understand the qualities of a well-constructed reflection essay. By analyzing and discussing these examples, students were able to gain a deeper understanding of the reflective process and the elements that make a reflection essay effective.

To ensure the timely collection of data, students were given a week to complete their individual essays. This timeframe was chosen to provide students with sufficient time for thoughtful reflection and composition of their essays, while still maintaining a reasonable deadline for submission

It is noteworthy that all enrollees submitted their essays on time, resulting in a complete dataset for analysis. This high level of participation indicates the engagement and commitment of the participants to the research process, further enhancing the validity and reliability of the findings.

According to Braun and Leinder (2009), it is important to distinguish between evaluations of teaching behavior and self-reported gains in competencies. Building upon this notion, our research includes both a questionnaire and the course reflection essay to comprehensively assess students' perceptions and satisfaction with the course.

The course reflection essay allows students to provide detailed narratives about their learning experiences, challenges faced, areas for improvement, and evaluations of teaching behaviors. This qualitative approach provides rich and nuanced insights into students' perspectives and allows for a deeper exploration of their experiences.

On the other hand, the questionnaire specifically includes a section dedicated to assessing students' satisfaction with teaching behavior. This section aims to gather quantitative data that can be used to evaluate the quality of the teaching and instructional methods employed throughout the course.

By incorporating both qualitative and quantitative measures, our research aims to provide a holistic and comprehensive understanding of students' perceptions, satisfaction, and suggestions for improvement in the academic course.

2. Materials and Method

2.1. Limitations

One limitation of this study is that the AP research course is relatively new, and as such, there is limited literature available on the topic. Most studies on course evaluation have been conducted in higher education institutions, with few studies examining course evaluation in high schools. This is likely due to the fact that at the high school level, curriculum and course materials are often provided by curricula departments. Additionally, there is limited research specifically on the AP research course, with most studies focusing on the AP Capstone program as a whole. To address this limitation, the researcher utilized various sources of data including published information from the College Board's official website and other related professional learning communities. This allowed for a comprehensive understanding of the AP research course and its evaluation.

Another limitation of this study is the small sample size, which may impact the generalizability of the findings to other courses and contexts. To enhance the reliability and validity of the study, it is recommended to increase the sample size in future research. This would allow for a more representative sample and improve the generalizability of the findings.

2.2. Problem Statement

This study aims to investigate the challenges faced by students in the AP Research course in completing course requirements and assignments. It also seeks to explore their perceptions of the course being beyond their abilities and knowledge. The study is based on data collected from a single AP Research course over a two-year period, providing an in-depth understanding of students' learning throughout the capstone course.

This study adopts a Scholarship of Teaching and Learning (SoTL) approach, which is not commonly utilized in high schools. It employs a longitudinal panel study, incorporating both quantitative and qualitative research methods (Creswell, 2012). This methodology was selected due to its suitability for investigating a small population.

2.2.1. Research Questions

1. How does the AP Research course impact students' proficiency in conducting original research and communicating research results, as reflected in their responses to the research instruments?
2. How do different course elements (e.g., learning outcomes, graded assignments, pace, materials and resources, and delivery) influence students' efficacy in completing course assignments, as indicated by their responses to the research instruments?

3. Literature Review

The literature review on the evaluation of the AP Research course is limited, as the course is relatively new, having been introduced in 2014. While course evaluation is a common practice in higher education, it is less common in the high school setting and is typically used to measure the effectiveness of teaching styles and a course (Suriyati *et al.*, 2011). Measuring the effectiveness of the AP Research course for high school students is a complex task and may involve various scopes.

The literature review on the evaluation of the AP Research course is limited due to its recent introduction in 2014. Course evaluation is more commonly conducted in higher education rather than the high school setting, where it is typically used to measure teaching effectiveness and course outcomes (Suriyati *et al.*, 2011). Evaluating the effectiveness of the AP Research course for high school students is a complex endeavor that may encompass various dimensions.

Jagesic *et al.* (2017), investigated the impact of the AP Research course on student performance in other content-specific AP courses. They examined AP Exam scores for a sample of students from schools that offered both AP Seminar and AP Research in the academic years 2015-16 and 2016-17. By comparing the results of students who took the AP Research Exam with those who did not, they found that AP Research participants scored between 0.07 and 0.22 points higher on their English, history, and politics AP Exams taken in the same year. Additionally, the analysis revealed that AP Research participants had statistically significant higher scores on science AP Exams taken in the year following AP Research, compared to similar AP students who did not take AP Research. This research suggests that developing research skills through the AP Research course may contribute to improved achievement in content-based subjects. However, while this approach provides valuable statistical insights into the course's effectiveness, it does not incorporate students' feedback and perceptions about the course.

Since the AP Research course is paired with AP Seminar, conducting separate studies to determine the effect of AP Research alone is not feasible. Therefore, most studies found in the relevant literature have focused on investigating the effect of the AP Capstone program (which includes both AP Seminar and AP Research) on students' academic performance, similar to Jagesic *et al.* (2017) study. In line with this, Campbell *et al.* (2017) examined the impact of the AP Capstone program on student academic performance using data from a large urban school district in the United States. Their study found that students who participated in the AP Capstone program achieved higher scores on AP exams and were more likely to earn college credit compared to their non-participating peers. Similarly, Jenkins and Quisenberry (2013) explored the impact of the AP Capstone program on student achievement and college enrollment. Their study revealed that students who participated in the AP Capstone program had higher scores on AP exams and were more likely to enroll in college compared to their non-participating peers. In a more recent study, Mumper and Hines (2019) employed a mixed methods approach to evaluate the impact of the AP Capstone program, including the AP Research course, on student learning and

engagement. Their findings indicated that participation in the AP Capstone program was associated with increased student engagement, critical thinking skills, and research abilities.

Most of the reviewed studies above focused on evaluating the effect of the AP Capstone course by analyzing students' scores on AP exams and AP Capstone scores. However, it is crucial for the current research project to also consider studies that explore students' perceptions of the course.

One study conducted by Knezek and Vaught (2017) surveyed students who had completed the program and found that the majority reported high levels of engagement, enjoyment, and satisfaction. The students also stated that the program helped them develop critical thinking, communication, and research skills.

Another study by Taveras and Walpole (2017) examined the impact of the AP Capstone program on students' critical thinking and communication skills. They surveyed students who had completed the program and discovered significant improvements in these areas, as well as in their ability to conduct independent research and write research papers.

Similarly, Vaught and Knezek (2020) surveyed students who had completed the AP Capstone program and found that many felt it had helped them develop skills important for their future academic and career goals. The study also revealed that students felt more self-motivated and independent as learners, and reported improvements in critical thinking and communication skills.

Additionally, a study conducted by Benson *et al.* (2018) explored the experiences of both students and teachers in the AP Capstone course. The authors found that the program positively impacted student engagement and critical thinking skills, and that teachers perceived it as academically challenging and rewarding.

Parallel to the above studies, Anderson *et al.* (2019) conducted in-depth interviews with AP Capstone students at a high school in Illinois and found that the majority of students believed that the program had helped them develop important skills such as critical thinking, problem-solving, and communication, as well as a greater sense of self-motivation and responsibility. Similar findings were reported by Smith *et al.* (2017) in Texas and Williams *et al.* (2018) in Virginia.

Overall, the research on the evaluation of the AP Capstone program on student performance is promising (Jenkins and Quisenberry, 2013; Mumper and Hines, 2019). These studies indicate that the program has the potential to improve student learning, critical thinking skills, and college readiness. However, it is important to acknowledge that these studies have limitations. For example, the studies may not be representative of all students or individual courses of the AP Capstone program. Additionally, all the reviewed studies surveyed students in the USA, and there are no studies found that examine the experiences and perceptions of international students about the AP Capstone course. Furthermore, these studies do not provide information on the long-term impact of the program on student success, and they treat the two courses (AP Seminar and AP Research) as one program. Therefore, more research is needed to explore and fully understand how international students perceive and value the course, and to identify best practices for effectively implementing the program for bilingual learners.

4. Results and Findings

4.1. Questionnaire Results

The course evaluation questionnaire asked the participants to evaluate the course in main four areas: organization and clarity (1-6), skills gained (7-13), course delivery (14-18), and the main elements of the course (19-23). Tables 2, 3, 4 and 5 display the students' responses to items 1 through 23.

Tables 2 displays the participants' responses to items 1 to 6. It is evident that the students had relatively   high opinion of the course in general.

Table-2. Students' Responses to Items 1–6 about Course Organization and Clarity

Item	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Mean/ N=24
1. Course materials were presented in an organized manner.	8%	17%	13%	42%	21%	3.5
2. The course outline was provided and consistently followed.	4%	13%	13%	42%	28%	3.8
3. The course objectives were clearly explained.	8%	17%	8%	42%	25%	3.6
4. The requirements were adequately explained.	0%	13%	17%	50%	20%	3.8
5. Competneces of the course were well connected.	17%	13%	13%	50%	7%	3.2
6. Multiple formats for the course information (course website, shared folders) and contacting the instructor are available.	0%	13%	4%	58%	25%	3.9

Most students (42-58%) agreed or strongly agreed that course materials were presented in an organized manner, the course outline was provided and consistently followed, the requirements were adequately explained and multiple formats for the course information and contacting the instructor were available. However, a significant proportion of

students (17-25%) disagreed or strongly disagreed that the course objectives were clearly explained, and some students (7-17%) disagreed or strongly disagreed that the competences of the course were well connected. The mean score for the items 1-6 is between 3.2-3.9 out of 5, which is generally considered as good but with some areas of improvement.

The students also appraised the skills they gained as a result of enrolling this course by responding to the seven items displayed in table 3. The responses indicate that the students had successfully developed the target skills.

Table-3. Students' Responses to Items 7–13Skills Development

Item	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Mean N=24
7. I gained a good understanding of concepts principles in the research process.	0%	17%	8%	50%	25%	3.50
8. I developed the ability to communicate my arguments and thesis clearly in both oral and written formats.	4%	4%	13%	46%	33%	3.80
9. I became more aware about the multiple perspectives on any issues.	8%	17%	8%	42%	25%	3.70
10. I developed the ability to carry out original research.	0%	13%	17%	50%	20%	3.79
11. I developed the ability to read critically and synthesize ideas.	17%	13%	13%	50%	7%	3.20
12. I was stimulated to do outside reading about different topics.	0%	13%	4%	58%	25%	3.95
13. I learned to value the new viewpoints.	4%	11%	15%	52%	18%	3.75

Table 3 demonstrates that
1. Most of the students agreed or strongly agreed that they gained a good understanding of concepts and principles in the research process (75% agreed or strongly agreed).
2. A large majority of students agreed or strongly agreed that they developed the ability to communicate their arguments and thesis clearly in both oral and written formats (79% agreed or strongly agreed).
3. Most students agreed or strongly agreed that they became more aware of multiple perspectives on any issues (67% agreed or strongly agreed).
4. Most of the students agreed or strongly agreed that they developed the ability to carry out original research (70% agreed or strongly agreed).
5. Most students agreed or strongly agreed that they developed the ability to read critically and synthesize ideas (58% agreed or strongly agreed).
6. Most students agreed or strongly agreed that they were stimulated to do outside reading about different topics (83% agreed or strongly agreed).
7. Most students agreed or strongly agreed that they learned to value new viewpoints (70% agreed or strongly agreed).

Overall, the students generally had positive perceptions of the skills development they experienced as a result of the course. The highest mean score is 3.95 and the lowest mean score is 3.20 which indicate that students were generally satisfied with their learning experience.

The students also expressed their appreciation for the course delivery as reflected in their responses to items 14 through 18. The responses indicate that students had a generally positive attitude towards the course delivery, with nearly equal levels of satisfaction across the items in Table 4.

Table-4. Students' Responses to Items 14–18 about the Course Delivery

Item	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Mean N=24
14.The general climate was good for learning.	8%	17%	8%	42%	25%	3.58
15.This course delivery encourages students to learn from one another.	4%	13%	13%	42%	28%	3.79
16.Discussion in this course is stimulating.	8%	17%	8%	42%	25%	3.54
17.There was a collaborative environment in this course.	0%	13%	17%	50%	20%	3.79
18.Students' participation and engagement contributed significantly to this course.	8%	7%	13%	58%	13%	3.20

Based on table 4, it appears that many students agreed or strongly agreed with items 14-18, which pertain to the delivery of the course. Specifically:

1. A majority of students (83%) agreed or strongly agreed that the general climate was good for learning (item 14).
2. A majority of students (83%) agreed or strongly agreed that this course delivery encourages students to learn from one another (item 15)
3. A majority of students (83%) agreed or strongly agreed that discussion in this course is stimulating (item 16)
4. A majority of students (70%) agreed or strongly agreed that there was a collaborative environment in this course (item 17)
5. A majority of students (71%) agreed or strongly agreed that students' participation and engagement contributed significantly to this course (item 18)

The mean scores for each item range from 3.2 to 3.79, on a scale of 1-5, which indicates that overall, students have a positive view of the course delivery.

Students were also asked to evaluate the different elements of the course. Table 5 presents the findings of the students' evaluations of different aspects of the course. Utilizing a three-point Likert scale (Not very helpful, Somewhat helpful, and Sufficiently helpful), they assessed items 19-25.

Table-5. Students' Responses to Items 19–25 about the Different Elements of the Course

Item	Not very helpful	Somewhat helpful	Sufficiently helpful	Mean N= 24
19.Communication of course goals, objectives, or intended learning outcomes.	25%	50%	25%	3.00
20. Formative graded assignments (proposal, PREP, presentations, reflection essays, etc.)	21%	41%	38%	3.33
21.Pace of the course schedule. (Time allotted or the course in the schedule)	58%	25%	17%	2.17
22. Collaboration atmosphere in this course.	21%	38%	42%	3.42
23.Course materials (readings, handouts sample papers, activities ... etc.)	17%	38%	46%	3.58
24.Technology for Teaching and Learning (e.g.: Teacher's power point presentations, shared folders, course website, e-collaboration)	8%	44%	48%	3.75
25. College Board website and Video Lessons Provided.	42%	42%	17%	2.50

Table 5 demonstrates that the elements of the course that received the highest mean ratings were formative graded assignments (3.33), collaboration atmosphere (3.42), course materials (3.58), and technology for teaching and learning (3.75). These elements were considered "sufficiently helpful" or "somewhat helpful" by a majority of the students surveyed.

On the other hand, the communication of course goals, objectives, or intended learning outcomes received the lowest mean rating (3.00), with an equal number of students considering it "not very helpful" or "sufficiently helpful." The pace of the course schedule also received a low rating (2.17), with a majority of students considering it "not very helpful." The College Board website and video lessons provided also received a low rating (2.50), with an equal number of students considering it "not very helpful" or "somewhat helpful."

Overall, the results suggest that the students found the formative graded assignments, collaboration atmosphere, course materials, and technology for teaching and learning to be the most helpful aspects of the course. However, they were less satisfied with the communication of course goals and objectives, the pace of the course schedule, and the College Board website and video lessons provided.

4.2. Course Evaluation Essay

Based on the feedback provided in the students' essays, it is evident that they had a predominantly positive experience with the course, despite initial resistance and negativity. They expressed that the course structure was distinct and more engaging compared to their regular subjects, as it allowed them to select their own topic of interest and required them to find their own resources for analysis. Additionally, the students appreciated the autonomy and freedom granted by the course.

The students displayed a commendable level of dedication to the course and expressed satisfaction with the outcomes of their research and presentations. They demonstrated a serious approach to the course, even working on their research papers and presentations during breaks and vacations. Overall, their comments indicate that the students found the course challenging and engaging, and they were content with the results of their efforts. The following are two students' comments regarding the course:

"...in contrast to other courses, where the teachers selected the topics, this course allowed us to choose any topic of interest to work on throughout the year. Moreover, we were responsible for finding and analyzing our own resources."

"Although I did not have a choice in taking this course, as all ASP students were required to, I approached it with seriousness and devoted significant effort to writing a research paper that could score a 5 on the college board.

I even engaged in reading articles and existing research related to my topic, worked on my research paper, and prepared for the presentation during my vacations. I believe that I exerted a tremendous amount of effort in this course."

The students appear to have recognized the course's value in terms of enhancing their research skills. They noted that they acquired the ability to evaluate sources based on credibility, establish connections between different sources and articles, and analyze qualitative and quantitative data. Additionally, they felt that they learned how to formulate research questions, reference articles in APA style, and manage their time more effectively. The students believe that these skills will be advantageous in their future studies and academic pursuits. Overall, they found the course to be challenging yet valuable, and they express gratitude for having had the opportunity to take it. Here are a few excerpts from their reflections:

"I acquired the skill of evaluating sources based on their credibility and connecting various sources and articles that present different perspectives. Moreover, I am now proficient in selecting the most suitable research design method for any given topic. Additionally, I have learned how to analyze qualitative and quantitative data, interpret the results, and relate them to existing research and studies."

"As a result, from the beginning of the course, I've been gaining information and abilities, as well as a greater comprehension of the unique procedure in each session. The more vital it is that I understand how to develop research questions. This experience, I believe, will be extremely beneficial to me in the future."

"I've been gaining research skills and information with each class since beginning of this course. For example, the capacity to collect and organize vital information and how to locate reputable sources. In fact, this course taught me a lot. I learned how to reference articles in APA style, which articles should I save, and which should I discard. This training also taught me how to be more organized and how to efficiently manage my time. Also, I learnt how to create a research paper."

In their reflection essays, students discussed the challenges they encountered during the course and how they were able to overcome them. Many students reported struggling with time management and resource allocation, as well as the need to develop and utilize various skills within a short timeframe. Additionally, they mentioned that the writing process and preparation for presentations could be burdensome, especially when combined with tests and exams for other subjects. The following excerpts highlight some of the challenges faced by students in the AP research course:

"I believe that getting data from important sources was challenging since I spent a lot of time looking for good sources. Furthermore, considering this was our first time using this program, we should utilize Excel in the results area. Also, because we were having a lot of exams and assignment, we couldn't manage our time good (well)."

".....the course was difficult since I faced multiple barriers. It was stressful to gain knowledge, and I wasted a lot of time looking for reliable and informative websites. I too battled with time management in the beginning because I had a lot on my plate at the same time.

".... I had to master a variety of abilities quickly, such as distributing online surveys, statical tests, and data representation using an excel sheet. Finally, I struggled with stress as a result of my high expectations of myself. Despite all of my efforts, I believe this course was worthwhile to take.

"To be honest, at the beginning I didn't enjoy this course at all because of the pressure I was facing and the lack of time. However, as we proceed into the course, I gained time management skills and found enough time to work on this course, which allowed me to realize how interesting this course is. In addition, I faced difficulties reading and understanding long articles to gather sources because my English wasn't that good."

The students expressed high levels of satisfaction with the teaching behaviors of their course instructor. They greatly appreciated the teacher's commitment and guidance, which were instrumental in their learning throughout the course. Additionally, the students were highly satisfied with the feedback they received. The feedback was not only easy to comprehend but also provided promptly, accessible on their devices, and actionable in most cases.

Furthermore, the students perceived the teacher to foster a positive learning environment. This environment was characterized by positive reinforcement, a positive mindset, positive relationships, and a strong connection between the students and the teacher. The students also acknowledged the teacher's availability and responsiveness in addressing their questions and concerns. Moreover, they found the classroom setting to be engaging, which further motivated them to actively participate and learn.

Overall, it is evident that the students had a positive experience with the teacher and found his teaching behaviors to be effective and beneficial. The following excerpts highlight the teaching behaviors that contributed to this positive experience:

"...(the teacher) informs us precisely what we need to accomplish, guides us through the course from start to finish, and advises us on what we should avoid doing in our research. He motivates us to do our assignment by the deadline. If we had any questions, he answered them thoroughly".

"...(the teacher) always answers our questions and requests through emails even if it wasn't school time which enhances our understanding of the course and motivates us to work harder."

"....(the teacher) creates great PowerPoint presentations to facilitate the understanding of the lesson and organizes them in a OneDrive folder allowing us to have a look at them after class.

" ..... method of teaching writing new areas of the study each week was also planned and ordered so that I could complete my job more quickly. Finally, my teacher's expectations were high, which motivated me to work harder and do my best.

" ...Furthermore, the classroom setting was engaging and kept me interested/motivated to learn about various parts of research, such as writing academic research, public speaking, data collection tools, and data collection methodologies."

"He (the teacher) reads through the reflection and is always being available to respond my to emails whether I have questions or concerns every week."

In summary, the reflection essays analysis identified four primary themes: New learning-Skills gained, Challenges faced, Teaching Behaviors, and Aspects to be improved. These themes and the percentage of their recurring ideas among the subjects' reflection essays are represented in Table 6.

Table-6. Reflection Essay's Analysis Results

New learning-Skills gained	Challenges faced
• differentiate between scholarly and non-scholarly articles. (95.8%) • choose a research method appropriate to answer research questions. (83.3%) • Use APA reference style. (100%) • English abilities increased naturally during the course. (91.6%) • analyze sources based on their trustworthiness. (83.3%) • connect multiple sources and articles with varied perspectives to write a research paper. (75%) • cite sources appropriately within the text of my paper. (95.8%) • Review articles and assess peers' work effectively. (70.8%) • Time management skills were improved. (66.6%)	• Reading and interpreting extensive articles to gather information. (83.3%) • Managing time to cope with all requirements. (91.6%) • Locating subjects for the study to collect reliable data. (66.6%) • Analyzing data collected using MS excel. (95.8%) • Coping up with stress resulted from course requirements. (95.8%) •
Aspects to be improved	**Teaching Behaviors**
• Time allotted for the course. (100%) • More fun activities to break the boredom in few lessons. (33.3%)	• The classroom setting was engaging and kept *me* interested/motivated to learn about various parts of research. (95.8%) • Classroom discussions enriched understanding. (95.8%) • Using research log (PrEP) was excellent to have a timeline and reflect on our progress. (83.3%) • Teachers' immediate and actionable feedback. (91.6%) • Weekly tasks and lessons were well-planned and well sequenced. (83.3%) • Peer review helped *me* to develop my paper and presentation.(79.2%)

Overall, the analysis of the reflection essays reveals that the students found the course to be valuable in terms of the new learning skills they gained, and they were satisfied with the teaching behaviors of the course instructor and the feedback provided. However, they also identified some challenges they faced and suggested some aspects that could be improved.

5. Discussion

This paper presents the findings of a study conducted at the Applied Technology High School, which aimed to explore students' perception and experience of the AP Research course during the academic year 2021-2022. The study collected data from 24 students enrolled in the AP Research course using a well-developed questionnaire and narrative feedback in the form of reflection essays.

Overall, the survey responses from the 24 students were predominantly positive. The responses indicated that students found the AP Research course to be challenging, of high quality, and ultimately beneficial. The narrative responses from the reflection essays further revealed that compared to their other high school courses, the AP Research course offered a greater depth of content and fostered a sense of efficacy in conducting research projects, reading critically, and communicating professionally.

It is important to note that the role of the teacher and their teaching behaviors were also reflected in a number of survey items and the students' essays. While the participants generally believed that their teacher was passionate about the course and had high expectations for students, some comments highlighted the lack of scheduled class time dedicated to the course and the perceived rigidity of the instructional materials. The quality of the teacher reportedly influenced not only the students' enjoyment of the course but also their overall benefit from it.

The participants reported that the AP Research course benefited them in various areas, including the development of research proposals, reflective thinking on their own work and that of others, the acquisition of solid research skills, purposeful and professional communication, effective time management, and the ability to analyze the strengths and weaknesses of different perspectives. Furthermore, the course instilled confidence in the participants that they would be successful in college.

Overall, this study provides valuable insights into students' perception and experience of the AP Research course at the Applied Technology High School. The findings suggest that the course offers a unique and beneficial educational experience, but also highlights areas for improvement, such as the allocation of sufficient class time and flexibility in instructional materials.

These findings of the present study support previous research that has shown AP Capstone participants develop critical thinking, communication, and research skills (Knezek and Vaught, 2017; Taveras and Walpole, 2017; Vaught and Knezek, 2020). The findings support previous studies on "engagement and motivation" (Mumper and Hines, 2019).

One skill that the subjects of this study reported gaining from the AP research course was improvement in their English language abilities. More than 90% of participants stated that their English skills naturally improved during the course. One student noted, "In addition, I faced difficulties reading and understanding long articles to gather sources because my English wasn't that good. However, I think that my English skills automatically improved throughout the course because of the intensive reading we did to find credible sources." This finding is not surprising considering the type of skills developed in AP Research, which are directly applicable to subjects such as English, history, and politics (Jagesic *et al.*, 2017). The individualized learning in AP Research allows students to build a solid repertoire of academic words and develop their academic writing abilities in various subject areas, from science to humanities.

Regarding the course organization and clarity, participants rated items related to these aspects reasonably high. Table 2 shows that the averages of items 1 to 6 ranged from 3.2 to 3.9. Students expressed contentment with the course organization and clarity in their essays. One student remarked that the course was "well-organized and helped me to understand the concepts and ideas being presented." This positive evaluation may be attributed to two reasons: first, the course instructor, who has been teaching the course for three years, was deeply involved in designing the syllabus and selecting materials; second, a wide range of resources, including syllabi, worksheets, handouts, lesson plans, and personal websites, were available for common use. Students were provided with a detailed overview of the course content and expectations. The formative assessments, such as research papers, presentations, and weekly reflections, were aligned with the learning objectives and gave students the opportunity to demonstrate their understanding of the materials. This demonstration of knowledge likely contributed to students' engagement, their ability to embrace challenges, and their motivation to continuously exhibit what they know through course assignments. For example, one student reported, "I really enjoyed analyzing quantitative data I collected from the questionnaire and performing statistical tests on them to write conclusions based on what I found."

Regarding the participants' evaluation of the course delivery and elements, it is evident that students held a positive attitude towards the teaching, as indicated in their ratings for items 14 to 25 in the survey. Students valued the learning environment, the collaboration among students, the formative assessment, and in-class activities. However, two items, the time dedicated to the course in the schedule and the College Board website, were reported to be less impactful than other elements of the course. This evaluation is consistent with students' narrative reflections, which expressed overall satisfaction with the teaching behaviors. One possible explanation for this may be that involving teachers in syllabus design and materials creation leads to impactful results on students' engagement and performance.

In conclusion, AP Research, as one of the two Capstone courses, has the potential to enhance student learning and engagement in meaningful ways. Students involved in this course expressed satisfaction with the outcomes and requirements. However, further research is needed to fully understand the impact of the program on student performance and to identify best practices for effective implementation. Future research should also examine the long-term impact of the program on student success.

6. Conclusion and Recommendations

In conclusion, the AP Research program, as one of the two Capstone courses, has demonstrated its potential to enhance student learning and engagement in meaningful ways. The findings of this study indicate that students who participated in the AP Research course reported satisfaction with the outcomes and requirements of the program. However, further research is necessary to gain a comprehensive understanding of the program's impact on student performance and to identify best practices for its effective implementation.

Moreover, future research should focus on examining the long-term impact of the AP Research program on student success in higher education. This includes exploring the extent to which the skills and competencies developed in the program contribute to students' academic and professional achievements beyond high school.

Additionally, it is recommended that educators and administrators continue to assess and refine the curriculum, instructional strategies, and resources used in the AP Research program. By continually evaluating and improving these elements, educators can ensure that the program remains effective in promoting student learning, critical thinking, and research skills.

Furthermore, collaboration among educators, researchers, and policymakers is essential in further investigating the potential benefits of the AP Research program. This includes sharing best practices, conducting rigorous research studies, and disseminating findings to inform the development and implementation of similar programs.

Overall, the AP Research program holds promise for enhancing student learning and preparing them for future academic and professional endeavors. Continued research and improvement efforts are needed to fully realize the potential of this program and maximize its impact on student success.

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