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Impact of Students' Self-Assessment on Their Critical Thinking in Higher Education

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Abstract: The importance of critical thinking in students' learning process is well established, however, few studies have evaluated the perceptions of university students regarding the correlation between self-assessment and critical thinking. This study measured the relationship between university students' self-assessment and critical thinking. The researcher followed a quantitative research design to conduct this study. A total of 302 students participated in the study from the University of Swat, Khyber Pakhtunkhwa, Pakistan. The data from the sample group was measured through a self-developed questionnaire comprising 24 items covering different aspects of university students' critical thinking and self-assessment. The collected data were analyzed using SPSS version 20 and the major findings of the study suggested that critical thinking helps students improve learning and cultivates the ability to make choices and guides them to understand problems and to contribute to identifying and solving problems. The study concluded that self-assessment also helps in taking responsibility and promoting understanding of course content.

Keywords: Critical thinking, self-assessment, opportunity, challenges, learning process

1. Introduction

Students' self-assessment of knowledge and skills acquisition are important domains of learning in education. Through this, the students not only gain the ability to critically evaluate their own performance but also get their choices recognized (Sailer, Stadler, Schultz-Pernice, Franke,

Schöffmann, Paniotova, & Fischer, 2021). Self-assessment provides ample opportunities for students to gain awareness about their potential and weakness in the process of learning. They compare their performance with others and with the prevailing standards and improve their weakness to reach the maximum degree of development (Yan, 2020). Self-assessment is the ability to monitor their own progress and achieve their set targets. Keeping in view the role of students in higher education, it is vital to examine the role of self-assessment in the promotion of critical thinking among university students as it is crucial for their success in different spheres of life. There is evidence that self-assessment promotes critical evaluation and thinking (Alek, Marzuki, Farkhan, & Deni, 2020). Studies have indicated that self-assessment possibly fosters monitoring of self-progress and development and in this way, students are able to revise their own strategies in learning. Scholars have argued that self-assessment enables students to pay full attention to all aspects of their academic performance. This provides them a chance to improve their abilities to further excel. However, despite the large body of knowledge supporting the positive effect of self-assessment and critical thinking skills among students, very few studies have examined the relationship between self-assessment and students' critical thinking in higher education (Seifert & Feliks, 2019).

1.1 Self-Assessment

In the last few decades, self-assessment has been discussed broadly in the education field. It has continued to grab the attention of researchers as a factor affecting students' academic progress. Self-assessment can be used as a tool to monitor and evaluate one's own pace of development in learning. Kolb's learning theory also emphasizes reflection as an important element of learning. Through reflection or self-assessment students find out their strengths and weaknesses in the process of learning and adopt different strategies to improve their performance. Studies on self-assessment have found a strong correlation between self-assessment and students' better performance (Ratminingsih, Marhaeni & Vigayanti, 2018).

In the last few decades, there is an increasing tendency among researchers to investigate the role of self-assessment or assessment as a frequently affecting factor of learning. Many researchers examined the effect of self-assessment as an alternative means to evaluate the progress and development of students. They concluded that self-assessment was a good measure to see the various dimensions of their ability to learn (Panadero, Jonsson & Botella, 2017). Most of the studies indicated the important pedagogical benefits of self-assessment for students at cognitive and affective levels. Some examined the effectiveness of self-assessment among young language learners. They found that the ability of students to self-assess their progress in learning improved over the period manifold. They found a positive correlation between students' self-assessment and their self-recognition. Some studies have found a marginal effect of self-assessment on students' critical evaluation ability. It was revealed that students were able to report that their confidence level went up because of self-assessment. More recently, research based on self-assessment among students across all levels of education has concluded that there was a positive strong correlation between self-assessment and academic performance or learning achievements of students (Carter, Creedy & Sidebotham, 2017).

1.2 Critical Thinking

Critical thinking is one of the essential learning outcomes in higher education. It is the ability to think independently and propose solutions for problems. It is an important aspect of both personal and professional life. In the last few decades, critical thinking has emerged as an essential topic for discussion in higher education. According to the Association of American Colleges and Universities, critical thinking is one of the most coveted abilities demanded by 73 percent of employers in the current job market. They have emphasized higher education institutions to place high stress on critical thinking and analytical reasoning. A recent survey of these associations has declared critical thinking as a core objective of higher education (Ali, Crawford & Horn, 2019).

Although, there is a high emphasis on the importance of critical thinking in literature. In California, about 19 percent of the teachers in universities could give clear explanations of critical thinking (Demirdag, 2019). Research has interestingly indicated that faculty members do accept the importance of critical thinking and wanted to promote it, but they did not know how to promote it. Thus, there is no consensus among instructors about the concept and meaning of critical thinking and its applications. However, in common parlance, critical thinking basically includes disposition and orientation, analytical and problem-solving skills, application of a variety of perspectives and general awareness about one's own assumptions, capacity for metacognition and set of thinking processes (You & Jang, 2019).

Research has revealed that critical thinking can be shaped through the application of different learning strategies. A review of the existing literature shows that critical thinking in higher education has been discussed in two ways: efforts for the reconceptualization of critical thinking and its fast-diminishing array of definitions (Sarasvati & Sriyati, 2019). Studies have examined the relationship of critical thinking and students' disposition, perception and learning achievements. Teachers have been found using the critical thinking approach as a standalone course within the general academic skills programs. There are some studies which have evaluated critical thinking as the learning outcome whereas in other contexts it has been treated as a predicting variable (Andrade, 2019).

Many studies in Pakistan have found a low level of critical thinking among students of higher education. The system of education has been found geared towards epitomizing rote learning and grades. As a result, there is an increasing trend towards developing critical thinking skills to gaining good grades through memorization of content material (Futami, Noguchi-Watanabe, Mikoshiba & Yamamoto-Mitani, 2020). However, on the contrary, researchers have declared critical thinking to be one of the essential aspects of higher education yet a challenging one to teach. Despite many research studies on critical thinking, its teaching and practice have always remained contested and difficult. To date, few studies have collected empirical evidence on the application of critical thinking in relation to self-assessment in the context of higher education. This study aims to examine the relationship between self-assessment and critical thinking among university students in Pakistan. The study may contribute to the existing body of knowledge by collecting essential and valuable empirical evidence regarding the correlation between self-assessment and critical thinking as important constructs of education.

2. Method

The main purpose of the study was to investigate the relationship between students' self-assessment and their critical thinking. The design of this study was quantitative in nature where the researchers adopted a correlational research design for this study. The researcher used this design to investigate the relationship between students' self-assessments and their critical thinking.

2.1 Population and Sampling

The research population is one of the most important steps in empirical studies from whom the sample group is selected and the results are generalized to them. This research population included all BS, students enrolled at the University of Swat. A total of 100 (n= 39 female and n=61 male) male students participated in study conveniently from social sciences and natural sciences departments.

2.2 Instrumentation

The data were collected through two scales. The critical thinking scale and self-assessment scale. The two scales were put together in one questionnaire consisting of 24 items, based on a Likert type scale. Four options were given to the respondents to share their perceptions ranging from strongly agree (5), agree (4), neutral (3) disagree (2) and strongly disagree (1).

2.3 Reliability and Validity

Before the data collection process, a pilot study was conducted to ensure the reliability and validity of the data questionnaire. The pilot study was conducted on 30 students and these respondents were not included in the sample group of the study. The content validity of the research tool was measured through expert opinion. The questionnaire was administered to four experts in the center for Education & Staff Training, at the University of Swat. The questionnaire along with research objectives was shared for the purpose of content validity. The experts proposed different changes in the items and format and errors were identified from grammar perspectives, all the recommended changes were discussed with the supervisor and accordingly, changes were made. The reliability coefficient was measured through Cronbach alpha value. The overall reliability of the questionnaire was $\alpha = .741$. This value shows that the questionnaire was 74.1% reliable and can be used for data collection.

2.4 Data Analysis

The collected data were placed into SPSS version 20 for the analysis and percentage and Mean Score, Standard Deviation, Chi-Square and Pearson's r correlation were calculated.

3. Results

This section provides information about the analysis and interpretations of the collected data from the respondents of the study.

3.1 Demographic Information

Table 1: Gender-wise details of the study participants

Gender	Frequency	Percent	Valid Percent	Cumulative Percent
Male	61	61.0	61.0	61.0
Female	39	39.0	39.0	100.0
Total	100	100.0	100.0	

Table 1 shows the gender-wise details of the study participants. There were 61% of male students representing different academic departments at the University of Swat. Similarly, 39% of females were also included in the sample group of the study. To conclude majority 61% of the participants were male.

3.2 Department Wise Description of the Study Participant

Table 2: Department-wise description of the study participants

Discipline	Frequency	Percent	Valid Percent	Cumulative Percent
Natural Sciences	48	48.0	48.0	48.0
Social Sciences	52	52.0	52.0	100.0
Total	100	100.0	100.0	

Table 2 shows the department-wise details of the study participants. There were 48% students representing the Natural Sciences department at the University of Swat. Similarly, 52% of students were also represented by the Social Sciences department. To conclude the majority of the students 52% were from different departments of Social Sciences of the University of Swat.

3.3 Students' Perceptions of the Uses of Self-Assessment

Table 3: Students' perceptions about the uses of self-assessment

Statements	Mean	SD	df	χ2	Sig
S-A encourages students for taking learning responsibilities	3.62	.58223	03	1.1292	.000
S-A reduces the assessment load on teachers	3.14	.72502	03	57.120	.000
S-A promotes deep understanding of content of the subject	3.29	.57375	03	1.0042	.000
S-A prepares students for their future plan	3.22	.83581	03	41.920	.000
S-A is useful source of feedback on the students' performance	3.36	3.19570	03	83.200	.000
S-A enables students to criticize in learning process	2.76	.76700	03	47.680	.000
S-A helps students to develop their judgment skills	3.19	.80019	03	40.080	.000

Table 3 reflects the students' perceptions about the uses of self-assessment in the teaching-learning process. The mean score of 3.62 with a standard deviation of .58223 showed that respondents strongly agreed with the statement that self-assessment encourages students to take responsibility for their learning. Furthermore, the df value of 03 and χ2 value of 1.29E2 which is significant at .000 which shows that the results are significant. Likewise, 3.14 with .72502 (mean, SD) showed that respondents agreed with the statement that self-assessment reduces the assessment load on teachers. Furthermore, the df value of o3 and χ2 value of 57.120 which is significant at .000 which shows that the result is significant. The mean score of 3.29 with a standard deviation of .57375 showed that respondents agreed with the statement that self-assessment promotes a deep understanding of the content of the subject/concept. Furthermore, the df value of 03 and χ2 value of 1.004E2 which is significant at .000 which shows that the results are significant. The mean score of 3.22 with a standard deviation of .83581 showed that respondents agreed with the statement that self-assessment prepares students to plan for their future learning. Furthermore, the df value of 03 and χ2 value of 41.920 which is significant at .000 which shows that the results are significant. The mean score of 3.36 with a standard deviation of 3.19570 showed that respondents agreed with the statement that self-assessment is a useful resource of feedback about students' performance. Furthermore, the df value of 03 and χ2 value of 83.200 which is significant at .000 which shows that the results are significant. The mean score of 2.76 with a standard deviation of .76700 showed that respondents agreed with the statement that self-assessment enables students to criticize during the learning process. Furthermore, the df value of 03 and χ2 value of 47.680 which is significant at .000 which shows that the results are significant. The mean score of 3.19 with a standard deviation of .80019 showed that respondents agreed with the statement that self-assessment helps students to develop their judgment skills. Furthermore, the df value of 03 and χ2 value of 40.080 which is significant at .000, enabling students to improve their judgment skills while taking part as active participants in the learning process which shows that the results are significant.

3.4 Students' Perceptions of Techniques of Self-Assessment

Table 4: Students' perceptions about techniques of self-assessment

Statements	Mean	SD	Df	χ2	Sig
S-A is effective in critical thinking development	3.48	.65874	03	85.520	.000
SA supports students in their learning style	3.60	3.16228	03	1.0092	.000
S-A is important stakeholder in assessment	2.95	.79614	03	41.040	.000
S-A develops critical thinking among students	3.02	.76515	03	54.560	.000
Students suspends judgment until all of the facts have been considered	3.03	.70288	03	95.440	.000

Table 4 reflects the students' perceptions of techniques of self-assessment in the teaching-learning process. The mean score of 3.48 with a standard deviation of .65874 showed that respondents agreed with the statement that self-assessment is effective in critical thinking development. Furthermore, the df value of 03 and χ2 value of 85.520 which is significant at .000 which shows that the results are significant. The mean score of 3.60 with a standard deviation of 3.16228 showed that respondents strongly agreed with the statement that self-assessment supports students in their learning style. Furthermore, the df value of 03 and χ2 value of 1.009E2 which is significant at .000 which shows that the results are significant. The mean score of 2.95 with a standard deviation of .79614 showed that respondents agreed with the statement that the students are important stakeholders in assessment. Furthermore, the df value of 03 and χ2 value of 41.040 which is significant at .000 which shows that the results are significant. The mean score of 3.02 with a standard deviation of .76515 showed that respondents agreed with the statement that self-assessment develops the faculty of critical thinking among students. Furthermore, the df value of 03 and χ2 value of 54.560 which is significant at .000 which shows that the results are significant.

The mean score of 3.03 with a standard deviation of .70288 showed that respondents agreed with the statement that students suspend judgment until all of the facts have been considered. Furthermore, the df value of 03 and χ2 value of 95.440 which is significant at .000 which shows that the results are significant.

3.5 Understanding of Critical Thinking

Table 5: Understanding of critical thinking

Statements	Mean	SD	df	χ2	Sig
Critical thinking is a way of processing and using information for betterment	3.15	.7194	03	75.900	.000
Critical thinking gives students the ability to make their own choices in their learning	3.27	.8022	03	57.840	.000
The critical thinker looks for evidence to support assumptions and beliefs	3.22	.7896	03	52.152	.000
The critical thinker examines problems closely from all aspects	3.23	.7895	03	52.882	.000
Critical thinking concentrates on the alternative mechanism of things	3.07	.7555	03	52.400	.000
The critical thinker takes on the role of lifelong learning as a challenge and applies them to make contributions to the world	3.06	.8969	03	41.840	.000

Table 5 shows the students' understanding of critical thinking in the teaching-learning process. The mean score of 3.15 with a standard deviation of .7194 showed that respondents agreed with the statement that critical thinking is a way of processing and using information for betterment Furthermore, the df value of 03 and χ2 value of 75.900 which is significant at .000 which shows that the results are significant. The mean score of 3.27 with a standard deviation of .8022 showed that respondents agreed with the statement that critical thinking gives students the ability to make their own choices in their learning Furthermore, the df value of 03 and χ2 value of 57.840 which is significant at .000 which shows that the results are significant. The mean score was 3.22 with a standard deviation of.7896 showed that respondents agreed with the statement that the critical thinker looks for evidence to support assumptions and beliefs Furthermore, the df value of 03 and χ2 value of 52.152 which is significant at .000 which shows that the results are significant. The mean score of 3.23 with a standard deviation of .7895 shows that respondents agreed with the statements that the critical thinker examines problems closely from all aspects. Furthermore, the df value of 03 and χ2 value of 52.882 which is significant at .000 which shows that the results are significant. The mean score of 3.07 with a standard deviation of .7555 shows that respondents agreed with the statements that Critical thinking concentrates on the alternative mechanism of things. Furthermore, the df value of 03 and χ2 value 52.400 which is significant at .000 which show that the results are significant.

The mean score of 3.06 with a standard deviation of .8969 shows that respondents agreed with the statements that the critical thinker takes on the role of lifelong learning as a challenge and applies to that challenge to make contributions in the world.

Furthermore, the df value of 03 and χ2 value of 41.840 which is significant at .000 which show that the results are significant. The sum of the above findings regarding the effect of critical thinking, it can be concluded that critical thinking is not only necessary for using information but it also inculcates abilities among students that enable them to make their own choices, and hence, provide them the opportunity to actively participate in the learning process. Besides, critical thinking leads students to search for alternative mechanisms that would help them to address potential problems in the way of the learning process, and also make them capable to shoulder responsibilities while handling challenges in their learning process.

3.6 Critical Thinking of University Students

Table 6: Critical thinking of university students

Statements	Mean	SD	df	χ2	Sig
I am able to learn from both success and failure in positive manner	3.07	.8318	3	32.720	.000
I am able to adjust my goals in light of changing circumstances	3.07	.6705	3	69.840	.000
Critical thinker is able to adjust opinions when new facts are found	3.51	3.0665	4	99.400	.000
The critical thinker is able to reject information that is irrelevant	3.01	.8226	3	35.280	.000
The critical thinker is able to see that critical thinking itself is a long process	3.06	.7761	3	68.400	.000

Table 6 shows the student's critical thinking in the teaching-learning process. The mean score of 3.07 with a standard deviation of .8318 showed that the respondents agreed with the statement that they can learn from both success and failure in a positive manner Furthermore, the df value of 03 and χ2 value of 32.720 which is significant at .000 which shows that the results are significant. The mean score of 3.07 with a standard deviation of .6705 showed that the respondents agreed with the statement that they can adjust their goals in the light of changing circumstances Furthermore, the df value of 03 and χ2 value of 69.840 which is significant at .000 which shows that the results are significant. The mean score of 3.51 with a standard deviation of 3 .0665 showed that the respondents strongly agreed with the statement that the critical thinker is able to adjust opinions when new facts are found. Furthermore, the df value of 03 and χ2 value of 99.400 which is significant at .000 which shows that the results are significant. The mean score of 3.01 with a standard deviation of 3 .8226 showed that the respondents agreed with the statement that critical thinkers can reject information that is irrelevant. Furthermore, the df value of 03 and χ2 value of 35.280 which is significant at .000 which shows that the results are significant. The mean score of 3.06 with a standard deviation of .7761 showed that the respondents agreed with the statement that the critical thinker is able to see that critical thinking itself is a long process. Furthermore, the df value of 03 and χ2 value of 68.400 which is significant at .000 which shows that the results are significant. The study found that critical thinking is not a time-specific process rather it is a process that encompasses, comparatively a long period of time, if encouraging students to be part of a time-consuming process, then the learning environment at any level of student's education would more obviously give positive results.

3.7 Relationship between Student's Self-Assessment and Their Critical Thinking Skills

Table 7: Relationship between student's self-assessment and their critical thinking skills

	Mean	SD	n	r	Sig
Self-assessment	41.72	6.110	98	.239	.018
Critical thinking	34.785	4.918	98		

The mean score for overall students' self-assessment was 41.72 with SD 6.110 and the critical thinking mean score was 34.785 with SD 4.918. These mean scores show that respondents agreed that they have skills in self-assessment and in critical thinking. The r value was .239 which was significant at .018. These results show that there is a significant association between students' self-assessment skills and their critical thinking. Furthermore, it is concluded that the understanding and application of self-assessment skills positively contribute to the critical thinking skills development.

4. Discussion

This study investigated the relationship between students' self-assessments and their critical thinking at the university level. The results show that there exists a strong relationship between self-assessment and learning style with mean scores and standard deviations of 3.60, 3.16228. Similarly, the results indicate a strong relationship of self-assessment as a stakeholder in the assessment process. This relationship is proven, statistically with a mean score and standard deviation of 2.95, .79614. Likewise, there exists a strong relationship between self-assessment and the development of critical thinking among students with a mean score and stander deviation of 3.02, and .76515 respectively. The results indicated a strong relationship between students' judgment and knowledge of all relevant facts. This relationship is statistically reported as a mean score and standard deviation of 3.03, .70288 which shows that the results are significant. This finding is in line with previous studies that self-assessment promotes critical evaluation and thinking (Alek, Marzuki, Farkhan, & Deni, 2020). Many respondents were of the view that critical thinking is a way of processing and using information for bringing improvement and betterment in teaching, hence uplifting the learning process of students. In this regard, the responses

of respondents show a significant relationship between critical thinking and improvement in the learning process with a mean score and standard deviation of 3.15, and .7194 respectively. Similarly, there exists a significant relationship between critical thinking and the ability to make choices in learning with a mean score and standard deviation of 3.27, and .8022. This finding also supports the results of former studies that teachers in universities could give clear explanations on critical thinking (Demirdag, 2019). The results, further, show that statistically there is a strong relationship between critical thinking and evidence that supports the assumptions and beliefs of students with a mean score and standard deviation of 3.22, and .7896. Similarly, the results, show that there is a significant relation between critical thinking and examining the problems in the learning process, this relation is statistically proven by the mean score and deviation of 3.23, and .7895. previous studies have similar results that self-assessment has a strong correlation with students' better performance (Ratminingsih, Marhaeni & Vigayanti, 2018). The study explored the relationship between critical thinking and the alternative mechanism that help students to actively participate in the learning process. This relation, statistically, exists between the above-given variables with a mean score and standard deviation of 3.07, and .7555. Similarly, the results confirm a strong relationship between critical thinking and contribution while taking and applying challenges in the way of the learning process with a standard deviation of 3.06, and .8969. The findings show the students' critical thinking, which makes them able to change their thinking after getting the relevant and authentic information, hence enabling them to adjust themselves to changing learning environment. The second part of the table indicates the statistical relationship between students' critical thinking and different prevailing circumstances. There is a significant relationship between critical thinking and students' failure or success with mean score and stander deviation of 3.07, and .8318. This finding suggests that both conditions (failure or success) help students to improve their critical thinking and, hence, motivate them towards good manners in their life. This finding of the study also correlates with the results of previous research that higher education institutions place high stress on critical thinking and analytical reasoning (Ali, Crawford & Horn, 2019). Similarly, there is a significant relationship between critical thinking and goals adjustment with the mean score and standard deviation of 3.07, and .6705. The finding indicates that critical thinking helps students to adjust their goals considering changing environments, hence increasing the chances of achieving the desired goals.

The findings show that there is a significant relationship between critical thinking and adjustment of opinion after finding new facts with mean score and standard deviation of 3.51, and 3.0665. This shows that critical thinking helps students to bring changes in their opinions and adjust them in light of facts that surface after they (students) study any issue/ phenomena. Similarly, there is a significant relationship between critical thinking and rejection of irrelevant information with a mean score and stander deviation of 3.01, and .8226. These findings suggest that critical thinking makes students, certainly, capable of even rejecting any irrelevant information during their course of study. These findings provide strong support for many findings of the previous research studies that self-assessment promotes critical evaluation and thinking (Alek, Marzuki, Farkhan, & Deni, 2020). On the other hand, the findings of this study show that there is a significant relationship between critical thinking and the length of time with a mean score and standard deviation of 3.06, and .7761. This finding indicates that critical thinking is not a time-specific process rather it is a process that encompasses, comparatively, a long period of time, if encouraging students to be part of this time-consuming process, then, the learning environment at any level of students' education would, more obviously, give positive results.

The findings, in this regard, suggest that there is a moderate effect of students' self-assessment on their critical thinking with mean scores and standard deviations of 41.72, 6.110, and 34.785, 4.918 respectively. The findings indicate that students' self-assessment is an important tool that provides the opportunity to critically examine the pro and cons of their course of study, enabling them to actively participate in the learning process. To sum up the above findings regarding the effect of critical thinking, it can be concluded that critical thinking is not only necessary for using information, but it also inculcates abilities among students that enable them to make their own choices and, hence, provide

them the opportunity to actively participate in the learning process. Besides, critical thinking leads students to search for alternative mechanisms that would help them to address potential problems in the way of learning process, and also make them capable to shoulder responsibilities while handling challenges in their learning process.

5. Conclusion

The study found that students' perceptions of self-assessment indicate a significant relationship between self-assessment and learning responsibilities. Similarly, it was also concluded from the findings that there is a significant relationship between self-assessment and reduction of load on teachers, this association proved that there is a significant relationship between self-assessment and inculcating critical thinking among students, which enables them to raise criticism on the learning process. Similarly, the findings also suggest a strong relationship between self-assessment and judgment skills enabling students to improve their judgment skills while taking part as active participants in the learning process.

The study finds out students' critical thinking skills at the university level indicated the statistical relationship between students' critical thinking and different prevailing circumstances. There is a significant relationship between critical thinking and students' failure or success This finding suggests that both conditions (failure or success) help students to improve their critical thinking and, hence, motivate them towards good manners in their student's life. Similarly, there is a significant relationship between critical thinking and goal adjustment. The finding indicates that critical thinking helps students to adjust their goals considering changing environments, hence increasing the chances of achieving the desired goals.

The third objective was to measure the relationship between students' self-assessment and critical thinking skills at the university level it shows Pearson's correlation between self-assessment and critical thinking. The findings, in this regard, suggest that there is a moderate effect of students' self-assessment on their critical thinking. The findings indicate that students' self-assessment is an important tool that provides the opportunity to critically examine the pro and cons of their course of study, enabling them to actively participate in the learning process.

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