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Effectiveness of intrusive advising of engineering first-year students using tailored freshman seminars

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Abstract

In many cases, students are unaware of some parts of their study plans or do not have enough information about utilizing available college resources that may help them through their study years. The purpose of this study was to propose and evaluate a method to improve engineering students' understanding of their study plans and available resources at their college. The proposed method is based on intrusive advising via tailored freshman seminars. The tailored freshman seminars are designed according to the students' study plans and presented in their introductory courses. These seminars covered information related to their academic study plans, requirements for graduation, and available college resources. The aim was to target all first-year students regardless of their academic standing. The results of the pre and post-test questionnaire survey have shown an overall improvement in the knowledge of students in terms of understanding these components with female students surpassing male students in almost all areas. The study recommends offering tailored freshman seminars to all first-year college students.

Keywords: university students, college students, university resources, student engagement, at-risk students

INTRODUCTION

Some college students are not familiar with some components of their study plans and thus the requirements for graduation. Also, not all students have enough information about different university resources that can help them through their college years. These issues might affect students' success at college. Academic advising is one of the important services that can help students overcome these challenges. Previous studies have emphasized the relation between efficient academic advising, student success, and retention in colleges (Drake, 2011; Steele, 2018; Young-Jones et al., 2013). By providing high-quality student advising programs, colleges can more efficiently guide students to select the proper programs and courses needed to progress towards their educational and career goals (Heissrer & Parette, 2002; Smith & Allen, 2018). An effective advising program is also one of the methods to provide students with positive feelings and motivation (Noel, 1978).

For college first-year students, academic advising is specifically needed in the experience of the students to offer them useful, concise, and precise information (Tinto, 2009). However, academic advising for this group of students has many challenges (Alamuddin et al., 2018; Soria et al., 2017). One strategy to overcome some of these challenges is using intrusive advising. This strategy is considered one of the effective strategies to help and retain students, especially at-risk and academically challenged students (Johns et al., 2017; Thomas, 2020). The definition of intrusive academic advising varies among different studies, but it usually includes providing students with advising sessions on a regular basis with the aim of motivating students and increasing their chances for a successful academic career (Earl, 1988; Glennen, 1983; Varney, 2007). Previous studies show that students are usually satisfied with this strategy (Johnson & Morgan, 2005; Vowell & Karst, 1987). The intrusive advising sessions are usually designed to help college students at risk of academic failure (Levinstein, 2018; Rios, 2019). However, it is

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Contribution to the literature

- The study explored the effectiveness of implementing tailored freshman seminars as a method to improve students' understanding of their study plans and available resources at their college.
- The study used a questionnaire survey to evaluate the students' knowledge before and after attending the seminars.
- The results suggest an overall improvement in the knowledge of students with female students surpassing male students in almost all areas.

believed that these advising sessions can benefit all students (Donaldson et al., 2020; Glennen & Baxley, 1985).

At Qatar University (QU), a major university in the Middle East, the College of Engineering believed that the general orientation that students attend when they first join the university is not sufficient. Therefore, the college started offering orientations specifically for engineering students. However, few students attended them. Students were also expected to attend one-to-one meetings with their academic advisors to learn about graduation requirements especially if they missed their college orientation. Unfortunately, many students do not attend these advising meetings and eventually face difficulties during their study years. Some of these difficulties include the psychological effect of later graduation than peers, the burden of unrequired courses taken by mistake, and sometimes being dismissed from QU.

To overcome these difficulties, the purpose of this study is to propose and evaluate a method to improve students' understanding of their study plan and the functions of the different university resources that can help them during their college years. The aim is to investigate the effect of intrusive advising via tailored freshman seminars on students' understanding of their academic study plans, the requirements for graduation, and the functions of the university resources. The study also aims to identify the most problematic areas for first-year students and develop recommendations to improve their learning and achievement.

METHODS

Case Study

The study was conducted in Qatar, a developing country in the Middle East with a high number of expats (Shaaban, 2019). QU is the main national university in Qatar (Shaaban & Kim, 2016). It is comprised of several colleges amongst which is the College of Engineering where the research was conducted. The College of Engineering offers eight undergraduate programs in addition to different masters and doctorate degrees (Shaaban, 2016; Shaaban & Reda, 2021). At QU, all first-year students attend a general orientation that usually includes two parts. The first part provides a brief explanation of university rules and a campus bus tour. The second part is allocated for students to register for the course of their first semester. The circumstances that govern this orientation do not allow any explanation of study plans for different majors. These include a large number of students, insufficient assigned time for registration, and the presence of students from different majors in the same registration lab. After that, students are expected to meet their academic advisors to help them plan for the coming college years. The is a challenging task for advisors especially with first-year students. In many cases, first-year students will not contact the advising offices unless they are facing difficulties.

Proposed Intervention

The proposed intervention for this challenge consists of providing tailored seminars to freshman engineering students at QU according to their majors. The tailored freshman seminars are designed for each major according to their study plan and presented in their introductory courses. They aim to achieve the objective of improving students' understanding of their study plans, their graduation requirements, and the functions of the university resources needed during their college years. In this case, instead of waiting for individual students to approach advisors, students are approached in the classes of their introductory courses using intrusive advising via tailored freshman seminars.

The seminars include the explanation of several university resources', the importance of these resources in certain situations, a study plan graph that explains its components, a graphical road map of the study plan to explain its time flow sequence, and an explanation of the banner degree evaluation system. This method was used for several reasons. First, there is a challenge in encouraging students to make advising appointments at QU, which is a common challenge as indicated in previous studies (Dudek et al., 2005; Fosnacht et al., 2017). Second, time limitation does not allow triangulation as it needs checking student usage of the acquired knowledge throughout their study years. An example would be tracking their registration status and comparing it with their study plan. Third, if successful, this method is considered a feasible and cost-efficient system that can be used by all advisors at QU. A pre-post-test technique was used to measure the effectiveness of this intervention.

Table 1. Pre- and post-test forms

No	Question
1	Write down the Qatar University resources that you know.
2	In the banner system, you can access the degree evaluation from: a. Student registration b. Student records c. Student services d. Personal information
3	Do you know which study plan you are following? If yes, write down its year. a. Yes (Plan year _____) b. No.
4	How many areas are there in your study plan?
5	List two areas in your study plan and one course from each area. a. Area _____ Course _____ b. Area _____ Course _____
6	If a student failed a course, this information will appear in the following pages of the degree evaluation: a. Detailed requirement b. General requirement c. Additional information d. None of the above
7	During the registration period, if a student finds that a course is not met in the banner degree evaluation, which of the following situations might be true? a. He thought he is registered for the course, but he is not, because he did not complete web registration steps. b. The course is not required in his major plan & is listed in additional information of the degree evaluation. c. He needs to do course substitution through his academic advisor. d. All of the above.
8	Student Aisha did not register for a course according to the time frame clarified in her study plan. Which of the following scenarios may apply? a. Her graduation may be delayed. b. She may face time conflict issues in registration. c. She may face pre-requisite requirements in registering for other courses. d. All of the above.
9	Student Fatma is in her last semester in college. After the end of the add and drop period, she was surprised that the degree evaluation in the banner system indicates that she is not eligible to graduate. The reason may be: a. She did not register for a required course. b. She did not complete the required credit hours. c. She should do a course substitute. d. All of the above.
10	Ahmad is an international student who usually becomes tense during exams and quizzes. Where would he find help on campus? a. Assistant dead for student affairs office. b. International student department. c. Counseling department. d. None of the above.
11*	What could we do to improve your knowledge and skills in planning for course registration towards timely graduation?

Note. *Included in post-test only

Data Collection

The data collection took place in the College of Engineering at QU. The intrusive advising session was conducted as a part of an introductory course in different engineering majors. Approvals of the college dean, heads of departments, and course instructors were secured before conducting the research. To test the effectiveness of the intervention, a pre- and post-test was used as a quantitative data collection technique. The tests were taken by engineering first-year students who are registered in an introductory course in their assigned major. The two tests were the same. They include 10 multiple choice and short answer open questions that cover the objectives of evaluating the intervention seminar (**Table 1**).

Questions one and ten measure students' understanding of the available university resources. Questions two to seven measure students' understanding of the components of their study plans, and questions eight and nine measure students' understanding of the graduation requirements. In the post-test, the participants were encouraged to share their

Table 2. Students' performance in knowledge of study plans

Student category	Pre-test			Post-test			p-value
	Number	Mean	SD	Number	Mean	SD	
All students	162	3.83	2.25	162	10.03	1.85	<0.001
Females	73	3.78	2.94	73	10.09	3.00	<0.001
Males	89	3.69	2.22	89	9.74	2.05	<0.001

Table 3. Students' performance in knowledge of graduation requirements

Student category	Pre-test			Post-test			p-value
	Number	Mean	SD	Number	Mean	SD	
All students	162	1.52	1.59	162	3.51	0.92	<0.001
Females	73	1.54	1.80	73	3.46	1.21	<0.001
Males	89	1.44	1.51	89	3.46	0.99	<0.001

perspectives in an open-ended manner by answering an open-ended question (question eleven). This question aimed to elicit student ideas for improving the existing services.

The pre-test was conducted in the second week of October before the intervention seminar. Each student was given a code that was used in the post-test as well to observe the change in each student's scores and use it in the analysis. The pre-test data was used to indicate the most problematic areas for students in relation to the seminar objectives to help in adjusting the learning experiences accordingly. The post-test was conducted in the third quarter of November.

The study targeted first-year engineering students who were registered in an introductory course in their majors. The sample was randomly selected. The total number of participating students was 162 including 73 females and 89 males from different engineering majors. A clear explanation was provided to the participants about the purpose and the process of this study. To ensure participants' confidentiality and freedom of harm, their names were not included in the study and the study results did not affect their actual course grades. The confidentiality of the participants was guaranteed by using a coding system to replace students' names.

RESULTS

Pre- and Post-Tests Comparison

The results of the pre and post-tests were analyzed using the SPSS software, and the open questions were analyzed manually. As the study employed the use of pre and post-tests to examine the effectiveness of the intervention, different calculations were performed including the mean, standard deviation, and p-value via t-test. **Table 2** provides a comparison of the results in the pre- and post-tests in the area of the study plans for the entire sample. The mean value of the total score for questions two to seven was calculated for females, males, and the entire sample to measure students' understanding of the components of their study plans. The total possible mark for this set of questions combined is 12 points. The mean values in the pre-test were 3.83 for the entire sample, 3.78 for females, and 3.69 for males. While in the post-test, the mean values were 10.03 for the entire sample, 10.09 for females, and 9.74 for males.

Overall, the results showed a high increase in the mean value for all groups from the pre-test to the post-test with females showing a higher mean than the males in both tests. Standard deviation was also calculated to determine how spread the results are from the mean score. The results showed a higher mean and small standard deviation in the post-test when compared with the pre-test for the sample as a whole, the females, and the males.

To calculate the p-value, a paired two-tail t-test was conducted by assuming that the mean in the pre-test is equal to the mean of the post-test at a 95% confidence level. This means that if the p-value is greater than 0.05, it indicated that the mean in the pre-test is equal to the mean of the post-test. If the p-value is less than 0.05, it will indicate that there is a significant difference between the mean in pre-test and post-test. The results of the t-test showed a statistically significant p-value for the whole sample, the females, and the males.

Table 3 provides the same comparison but for the area of understanding the graduation requirements. The mean values of the total score for questions eight and nine were calculated for females, males, and the entire sample to measure students' understanding of their graduation requirements. The total possible mark for this set of questions combined is four points. The mean values in the pre-test were 1.52 for the entire sample, 1.54 for females, and 1.44 for males. While in the post-test, the mean values were 3.51 for the entire sample, 3.46 for females, and 3.46 for males.

Overall, the results showed an increase in the mean value for all groups from the pre-test to the post-test with females showing a higher mean than the males in the pre-test but an equal mean in the post-test. However, even though males and females share the same mean in the post-test of the graduation area in the test, males had a smaller standard deviation that indicates better results

Table 4. Students' performance in available university resources

Student category	Pre-test			Post-test			p-value
	Number	Mean	SD	Number	Mean	SD	
All students	162	1.01	1.05	162	3.49	0.93	<0.001
Females	73	1.05	1.27	73	3.49	1.24	<0.001
Males	89	0.93	0.97	89	3.40	0.97	<0.001

Table 5. Students' performance in understanding study plans

No	Gender	Mean		p-value
		Pre-test	Post-test	
Q#2	Female	1.12	1.95	<0.001
	Male	1.03	1.89	<0.001
Q#3	Female	1.36	2.00	<0.001
	Male	1.30	1.93	<0.001
Q#4	Female	0.19	1.95	<0.001
	Male	0.16	1.86	<0.001
Q#5	Female	0.56	1.76	<0.001
	Male	0.46	1.66	<0.001
Q#6	Female	0.26	1.43	<0.001
	Male	0.22	1.39	<0.001
Q#7	Female	0.49	1.34	<0.001
	Male	0.52	1.06	<0.001

with the high mean. The p-values were minimal for all categories indicating statistically significant results.

Table 4 presents the same comparison but measures students' understanding of the available university resources. The mean value of the total score for questions one and ten in the pre- and post-test was calculated for females, males, and the entire sample to measure students' understanding of their graduation requirement. The total possible mark for this set of questions combined is four points. The mean values in the pretest were 1.01 for the entire sample, 1.05 for females, and 0.93 for males. While in the post-test, the mean values were 3.49 for the entire sample, 3.49 for females, and 3.40 for males.

Overall, the results showed an increase in the mean value for all groups from the pre-test to the post-test with females showing higher mean values than the males in both the pre-tests and the post-test. Standard deviation values are relatively small indicating that the sample scores are not widely spread around the mean. The small p-values indicate a statistically significant result.

Problematic Areas

The study also aims at finding the most problematic areas for first-year students. In terms of understanding their study plans, **Table 5** presents mean values for the pre-test and post-test for questions two to seven. Even though there is obvious improvement in students' understanding of the components of their study plans, the mean scores in the post-test of questions six and seven were not as high as the rest of the questions. The two questions measured students' understanding of banner degree evaluations. Also, question seven required students to use higher thinking skills than the rest of the questions.

Table 6. Students' performance in different areas of the components of their study plans in the pre- & post-tests

No	Gender	Mean		p-value
		Pre-test	Post-test	
Q#1	Female	0.43	1.87	<0.001
	Male	0.43	1.83	<0.001
Q#10	Female	0.68	1.73	<0.001
	Male	0.49	1.57	<0.001

In terms of understanding the available university resources, **Table 6** presents mean values for the pretest and post-test for questions one and ten. There is an obvious improvement in students' understanding in this area. However, the mean scores in the post-test for question ten were not as high as in question one. Question one just requires students to list the university resources. However, question ten requires students to analyze the state of a student to refer him to a suitable university resource.

Areas of Improvement

The post-test questionnaire included an extra question that aims at getting students' suggestions for improving the service to help them better understand and utilize their academic plans and the university resources. Seventy-nine students offered their opinions and suggestions. These suggestions could be classified as follows with actual quotes of their replies:

1. Twenty-nine students believed that in-class advising for several topics including the presented seminar would help all students.
   - "More orientations during classes."
   - "More additional seminars in classes, and I'm glad that the advising took the initiative to come to students."
   - "We need the same for more topics."
   - "This was very helpful. I think you should do the same for all students."
   - "Do the same to all students because I found it quite helpful."
2. Fifteen students expressed their preference of offering the same tailored seminar but earlier, more frequent, or at a different time and duration.

- "This presentation is very useful for the university student, but it should be presented for the student before they start their major."
- "Provide earlier orientations like at schools and then at university every year."
- "Make it every semester."
- "These types of lectures to help the students is a very good idea and choosing the time to give such lectures is preferred to be in the second year of the college years, but the lectures should take more time than that."

3. Eleven students think that online seminars would help them.
   - "Do a YouTube video about it as a tutorial so every student can watch it anywhere and anytime. Moreover, I would like to see other video tutorials of the whole banner system."
   - "Yes, it is helpful, and you have to apply it also for the other majors in the engineering college. We need the presentation online or sending it online."
   - "You are using graphical methods to arrange the information. It will be amazing if this is available on my banner service."
4. Seven students believed that there is no need for improvement.
   - "I feel it is important and no need to improve."
   - "I believe after the lecture we got in the class and the information we got that it is clear and easy to understand so there is no need to improve it right now."
5. Six students demanded that the college should offer different study plan options.
   - "Add major courses in both fall and spring."
   - "To help the students who are starting their study plan in the spring semester to not graduate later than other students."
   - "Give the fresh students a variety of plans and let them choose which are better for them."
6. Three students felt that providing hard copy documents would help them.
   - "In addition to what you have done in the lecture give us hardware copies as a summary about everything, thank you it was so useful."
7. Three students suggested that a freshman course would better help them
   - "It is better to offer it as an extra course in the plan."
8. Two students felt that the seminar was unnecessary and could be replaced by self-learning or by online communication.
   - "Students should take care of it by themselves."
   - "Access the college-student catalog. Check the student handbook. I think sending emails regularly the university mail would be helpful because students check the email daily."
9. Two students asked for better advising services by improving the quality and competence of academic advisors.
   - "Keep us up-to-date about the college decisions and listen to the students."
   - "Provide good advisors since some of them don't have enough knowledge."
10. One student suggested utilizing peer advising.
    - "We can make the graduated and senior students that have experts in using the registration skills set meetings with students to teach them how to use skills in planning."

These suggestions helped in generating recommendations and developing an action plan as indicated in **Table 7**.

CONCLUSION

One major concern in any academic institute is seeing students facing problems of late graduation due to a lack of proper knowledge of their study plans and the available college resources that may contribute to their success at college. In many cases, the orientations provided for new students are not enough to cover all areas. Also, students usually do not come to advising sessions unless they are already in trouble. Therefore, the proposed intervention in this study is to approach them in their classes instead of waiting for them to seek help. A tailored freshman seminar was designed and implemented on a sample of first-year undergraduate students in an introductory course in each major. The aim was to examine the effectiveness of the intervention by measuring the students' improvement.

The results showed an overall increase for the female and male students in terms of understanding the components of their study plans, the requirements for graduation, and the available university resources. Female students surpassed male students in all areas except for a tie in the area of knowledge of university resources in the post-test. Even though these results indicate positive effects of the intervention on students' outcomes, future research should consider tracking the acquired knowledge and skills by the students until graduation as this effort would take several years.

The results also identified the most problematic areas for first-year students. In terms of understanding their degree plans, understanding the banner degree evaluations was the main issue. Such an issue should be addressed by having more sessions about degree

Table 7. Proposed action plan

Findings	Recommendation	People in charge	Resources
The tailored seminars are effective	Offer it to all college first-year students	All academic advisors will teach it & to be approved by the dean	None
Using degree evaluation is the most problematic area for students in terms of understanding their study plans	Tutorials of degree evaluation should be offered & posted online in addition to providing hardcopy manuals	Academic advisors & IT specialist	Reservation of computer labs for offering tutorials That have lecture capture technology
The most problematic area for first-year students in terms of the available university resources is associating a certain need with the relevant resource	Designing hands-on learning experiences that better involve students in utilizing university resources	Academic advisors & an expert from the college of education	Free time for preparation Compensation for the expert
Students suggest having this seminar frequently for several topics	Design a freshman seminar course that includes several topics like study plans, library, blackboard, etc.	Academic advisors, a library specialist, IT specialist, & an expert from the college of education	Free time for preparation Compensation for participants from other colleges or departments
Students suggest having different study plans options	Design & propose plan "B" for all majors that start in spring as the first semester	Two academic advisors to prepare the proposal & the college board will evaluate it	No resources are needed for the design The implementation needs more human and physical resources
Students suggest providing better advising by improving the quality & competence of academic advisors	Offer programs for academic advisors	Center for academic advising & retention	Compensation for provider

evaluation and posting those sessions online as indicated in the action plan. In terms of the available university resources, the most problematic area for first-year students was associating a certain need with the relevant resource. This area should be addressed by designing hands-on learning experiences in the freshman seminar.

The open questions collected from the post-test included several suggestions by the students to improve the service in a way that would help them better understand and utilize their study plans and the available university resources. Most students suggested that they prefer in-class advising for several topics using the presented seminar. They suggested offering the same seminar to all students. In addition, some students believed that the seminar should be offered more frequently. Hard copy documents were requested by a few students while others asked to have the seminars posted online. Few students suggested offering such seminars as a university freshman course, offering different study plans' options, utilizing peer advising, and providing better advising by improving the quality and competence of academic advisors. Some students also suggested that the tailored seminar is good enough and no need to improve anything else, while others suggested that it is unnecessary and could be replaced by self-learning.

To sum up, the proposed intervention did prove its effectiveness. However, it needs further investigation and follow-up with students to measure their use of the acquired knowledge and skills. The students provided different suggestions to improve their understanding of the areas under study. These suggestions lead to the development of several recommendations. First, the tailored freshman seminar should be offered to all first-year college students. Second, the seminar should be lecture captured and posted online. Third, tutorials of degree evaluation should be offered and posted online in addition to providing hardcopy manuals. Fourth, a new freshman course should be developed to cover the topics included in the tailored seminar in addition to other topics like using the learning management system, banner system, library, etc. These topics should be decided by the students, advisors, and professors.

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REFERENCES

Alamuddin, R., Rossman, D., & Kurzweil, M. (2018). Monitoring advising analytics to promote success (MAAPS): Evaluation findings from the first year of implementation. *Ithaka S+R*. https://doi.org/10.18665/sr.307005

Donaldson, P., McKinney, L., Lee, M. M., Horn, C. L., Burridge, A., & Pino, D. Insider information: Advisors' perspectives on the effectiveness of enhanced advising programs for community college students. *NACADA Journal, 40*(2), 35-48. https://doi.org/10.12930/NACADA-18-26

Drake, J. K. (2011). The role of academic advising in student retention and persistence. *About Campus, 16*(3), 8-12. https://doi.org/10.1002/abc.20062

Dudek, J., Marriner, N., & Herreid, C. F. (2005). A word to the wise? Advising freshmen. *Journal of College Science Teaching, 34*(5), 10-12.

Earl, W. R. (1988). Intrusive advising of freshmen in academic difficulty. *NACADA Journal, 8*(2), 27-33. https://doi.org/10.12930/0271-9517-8.2.27

Fosnacht, K., McCormick, A. C., Nailos, J. N., & Ribera, A. K. (2017). Frequency of first-year student interactions with advisors. *NACADA Journal, 37*(1), 74-86. https://doi.org/10.12930/NACADA-15-048

Glennen, R. E. (1983). Effective outcome measures of intrusive advising programs. In J. E. Roueche (Ed.), *A new look at successful programs* (pp. 59-71). Jossey-Bass.

Glennen, R. E., & Baxley, D. M. (1985). Reduction of attrition through intrusive advising. *NASPA Journal, 22*(3), 10-14. https://doi.org/10.1080/00220973.1985.11071921

Heissrer, D., & Parette, P. (2002). Advising at risk students in college and university settings. *College Student Journal, 36*(1), 69-83.

Johns, D. D., Sasso, P., & Puchner, L. (2017). Adviser and faculty perceptions of the benefits and feasibility of intrusive advising. *Mentor: An Academic Advising Journal, 19*(2017). https://doi.org/10.26209/mj1961239

Johnson, E. J., & Morgan, B. L. (2005). Advice on advising: Improving a comprehensive university's program. *Teaching of Psychology, 32*(1), 15-18. https://doi.org/10.1207/s15328023top3201_3

Levinstein, M. (2018). *A case study of an intrusive advising approach for at-risk, under-prepared and traditionally underrepresented college students* [PhD dissertation, Kent State University].

Noel, L. (1978). *Reducing the dropout rate*. Jossey-Bass.

Rios, A. L. (2019). *Examining the impacts of intrusive advising on the retention and academic success of first-year, at-risk, community college students* [EdD thesis, St. John Fisher College].

Shaaban, K. (2016). Investigating the reasons for choosing a major among the engineering students in Qatar. In *Proceedings of 2016 IEEE Global Engineering Education Conference* (pp. 57-61). IEEE. https://doi.org/10.1109/EDUCON.2016.7474531

Shaaban, K. (2019). Analysis of pedestrian crossing speeds at signalized intersections in Qatar. *Arabian Journal for Science and Engineering, 44*(5), 4467-4476. https://doi.org/10.1007/s13369-018-3460-3

Shaaban, K., & Kim, I. (2016). The influence of bus service satisfaction on university students' mode choice. *Journal of Advanced Transportation, 50*(6), 935-948. https://doi.org/10.1002/atr.1383

Shaaban, K., & Reda, R. (2021). Impact of college provided transportation on the absenteeism and academic performance of engineering students. *Eurasia Journal of Mathematics, Science and Technology Education, 17*(3), em1944. https://doi.org/10.29333/ejmste/9727

Smith, C. L., & Allen, J. M. (2018). Predictors of advising learning. *Journal of Student Affairs Research and Practice, 55*(3), 270-284. https://doi.org/10.1080/19496591.2018.1474754

Soria, K. M., Laumer, N. L., Morrow, D. J., & Marttinen, G. (2017). Strengths-based advising approaches: Benefits for first-year undergraduates. *NACADA Journal, 37*(2), 55-65. https://doi.org/10.12930/NACADA-16-010

Steele, G. E. (2018). Student success: Academic advising, student learning data, and technology. *New Directions for Higher Education, 2018*(184), 59-68. https://doi.org/10.1002/he.20303

Thomas, N. G. (2020). Using intrusive advising to improve student outcomes in developmental college courses. *Journal of College Student Retention: Research, Theory & Practice, 22*(2), 251-272. https://doi.org/10.1177/1521025117736740

Tinto, V. (2009). Taking retention seriously: Rethinking the first year of university. *NACADA Journal, 19*(2), 5-9. https://doi.org/10.12930/0271-9517-19.2.5

Varney, J. (2007). Intrusive advising. *Academic Advising Today, 30*(3), 11.

Vowell, F., & Karst, R. (1987). Student satisfaction with faculty advisors in an intrusive advising program. *NACADA Journal, 7*(2), 31-33. https://doi.org/10.12930/0271-9517-7.2.31

Young-Jones, A. D., Burt, T. D., Dixon, S., & Hawthorne, M. J. (2003). Academic advising: Does it really impact student success? *Quality Assurance in Education, 21*(1), 7-19. https://doi.org/10.1108/09684881311293034