



Meet AD-VISOR: An Adaptive Advising System for a 21st Century Student Demographic

Mr. Mike Thomas Pitcher, University of Texas, El Paso

Mike Pitcher is the Director of Academic Technologies at the University of Texas at El Paso. He has had experience in learning in both a traditional university program as well as the new online learning model, which he utilizes in his current position consulting with faculty about the design of new learning experiences. His experience in technology and teaching started in 1993 as a student lab technician and has continued to expand and grow over the years, both technically as well as pedagogically. Currently he works in one of the most technically outstanding buildings in the region where he provides support to students, faculty, and staff in implementing technology inside and outside the classroom, researching new engineering education strategies as well as the technologies to support the 21st century classroom (online and face to face). He also has assisted both the campus as well as the local community in developing technology programs that highlight student skills development in ways that engage and attract individuals towards STEAM and STEM fields by showcasing how those skills impact the current project in real-world ways that people can understand and be involved in. As part of a university that is focused on supporting the 21st century student demographic he continues to innovate and research on how we can design new methods of learning to educate both our students and communities on how STEM and STEAM make up a large part of that vision and our future.

Dr. Peter Golding, University of Texas, El Paso

Professor of Engineering Education and Leadership, Undergraduate Program Director in the Department of Engineering and Leadership at UTEP, Director of the Center for Research in Engineering & Technology Education in the College of Engineering, and Provost Faculty Fellow in the Center for Faculty Leadership and Development at The University of Texas at El Paso.

Mr. Pedro Arturo Espinoza, University of Texas, El Paso

Pedro worked in the manufacturing industry as a Quality Control Engineer for some years before acquiring his current position as an Instructional Technologist at the University of Texas at El Paso (UTEP). For over eleven years in this role, he has worked with a team of managers that oversee various learning environments and systems in the Academic Technologies Department at UTEP. He leads a group of more than 30 multidisciplinary student employees that help support a wide range of technologies for classrooms and other learning spaces, including videoconferencing rooms. In addition to teaching a Foundations of Engineering course, Pedro also provides technology training on Mac OS X, CISCO networking and various other technology topics. He also enjoys the role of social media coordinator for Academic Technologies to showcase the department's services and the dedicated students and staff members who work there. Pedro received his Bachelor of Science degree in Electrical Engineering and a Master of Science in Engineering with a concentration in Engineering Education from UTEP.

Miss Crystal Fernandez-Pena, University of Texas, El Paso
Celena Arreola, The University of Texas, El Paso

Celena Arreola graduated on May 13, 2017 with Bachelors of Science in Engineering Leadership at the University of Texas at El Paso with a concentration in Mathematics and Civil Engineering. She has been actively involved within the Department of Engineering Education & Leadership as a recruitment leader and administrative assistant. Currently she serves as the president of the American Society for Engineering Education student chapter and is a research team leader in the Center for Research in Engineering and Technology Education where she focuses on the success of students in science, technology, engineering and mathematics of two post-secondary educational institutions based in El Paso.

Mr. Hugo Gomez, University of Texas, El Paso



Mr. Hugo Gomez works as an Instructional Technologist at the University of Texas at El Paso, he is focused on expanding the professional and technical skill sets of our students and faculty community to better prepare them for the world of technology today and tomorrow. He works alongside a wide assortment of students, faculty and staff on campus to make sure their technology toolsets are up to date. Furthermore, Hugo provides workshops to over half of the student population at UTEP and as such, has been instrumental in providing the behind the scenes support to all these courses. Mr. Gomez also collaborates in the Learning Lab team to explore and implement new educational strategies in the classroom. Mr. Gomez has a Masters Degree in Engineering Education from The University of Texas at El Paso. He has participated in the UTEACH summer program as a Technology Instructor in which he provided workshops on website design, movie creation and computer networking. In addition, Mr. Gomez teaches UNIV1301 Foundations of Engineering, where students learn academic, personal and engineering skills, among many other abilities that help them understand their opportunities and responsibilities as engineering students.

Hector Erick Lugo Nevarez, University of Texas, El Paso

Mr. Hector Lugo works as a Student Technology Success Coordinator at The University of Texas at El Paso. He holds a B.S. in Electrical Engineering. He is currently enrolled as a Master of Science with a Major in Electrical Engineering. His motivation and passion pushes him into research in wireless communication, especially in Bluetooth Low Energy and Near Field Communication as well as building projects and fostering innovation with faculty and staff members. As part of the Learning Environments division, the idea to develop, oversee and assess engaging students to expand their knowledge and creativity by innovating new technologies application for Engineering Education is currently under way to engage the university and the community. Concluding, Mr. Lugo's ambition is to encourage students to focus in science, technology and engineer abilities in order to expand their professional potential.

Mr. Randy Hazael Anaya, University of Texas, El Paso

Randy Anaya, Instructional Technologist at the University of Texas at El Paso. Received a BFA in Graphic Design with a minor in Multimedia design from the Universidad Autónoma de Ciudad Juárez, Mexico. Received a BA in Media Advertising at UTEP and is currently enrolled as a Master of Interdisciplinary Studies with an emphasis on the use of art and technology in teaching and learning. Randy works on research and development of applying the creative process to workshops, trainings and student engagement. Currently doing extensive research and deployment of emerging technologies to redefine the classroom, mentoring and excellence through student interaction.

Prof. Diane Elisa Golding, University of Texas, El Paso

Diane is a passionate educator and proponent for K-12 engineering education and the education of future teachers. She is a professor in the College of Education at the University of Texas at El Paso (UTEP). She earned her undergraduate and graduate degrees from UTEP and is presently pursuing her doctorate at the University of Southern California (May, 2019).

Miss Kelsi Marie Oyler, Engineering Leadership

I was born to a farm family in the panhandle of Oklahoma. I graduated from Liberal High School in Liberal, Kansas in 2011. I attended the University of Central Oklahoma in Edmond, Oklahoma starting with a major in Psychology. As I furthered my studies, my interest in helping people remained, but my focus shifted. I changed my major from Psychology to Family Life Education. I left school and worked in a Preschool setting for a couple of years before realizing that I was not passionate about my work. I moved to El Paso, Texas and was offered an Administrative position at a non-profit organization, LIMBS International. A team that took a Bio-medical engineering project and used affordable technology to fit amputees in developing countries. Due to a significant project closing, the LIMBS International Board could not justify a full-time position for me. One of the Board members is the department Chair for Engineering Leadership at UTEP and offered me a part-time front desk position. During my time in the

department, I was assigned to assist the Department Advisor during the advising process. I became very interested in my job and discovered a great need for students needing help and the limited time that the department professors had. I approached the Department Advisor and offered to come work with him with my primary focus being on advising. I am now taking on more of a leadership role in advising by sharpening my skills and learning more of how I can help students reach their goals while making the lives of the professors easier.

Ms. America Fernandez, University of Texas, El Paso

America Fernandez is an undergraduate student majoring in Engineering Leadership at The University of Texas at El Paso with interest in Engineering Education. Her college career began with a compelling drive to succeed as an engineering major. Academic experiences she has participated include an engineering education internship at Berekusio, Ghana and the authorship of a published paper presented at the Frontiers in Education conference. America is currently working with the Center for Research in Engineering and Technology Education as a Research and Development Specialist focusing on advising procedures. She currently serves as the President in the American Society of Engineering Educators Student Chapter at UTEP.

Mrs. Helen Elizabeth Geller, University of Texas, El Paso

Helen Geller is the Program Manager for the STEMGROW grant, funded by the Department of Education at the University of Texas at El Paso.

Luis Carlos Jimenez, University of Texas, El Paso

Luis C. Jimenez is an undergraduate student majoring in Computer Science at The University of Texas at El Paso with interest in Cyber Security. He is currently working with the Center for Research in Engineering and Technology Education as a Research and Development Specialist with an emphasis in technology implementation in the STEAM curriculum. Luis has been an active volunteer with organizations that try to help the community through engineering and technology and that try to foster the interest of the younger generation in STEM fields.

Ms. Jennifer Arreola, University of Texas, El Paso

Jennifer Arreola is pursuing a Bachelors in Engineering Leadership with a concentration in Environmental Engineering. She plans on working for the protection of human health and ecosystem. She believes that as an engineer the ability to understand not only the problem but other issues such as political, business and social are necessary to approach this new generation.

Ms. Andrea Annette Duenez

Andrea A. Duenez is a senior at the University of Texas at El Paso majoring in Engineering Leadership with a focus in Electrical Engineering. Andrea plans to graduate in December of 2018. In her free time, Andrea enjoys learning from and assisting sound engineers at her local place of worship, watching basketball, and exploring the outdoors.

Karla Alejandra Ayala

Karla Ayala is currently an undergraduate student pursuing a Bachelor of Science in Electrical and Computer Engineering at The University of Texas at El Paso. Karla strives to get a concentration in Computer Engineering to be at the forefront on the integration of hardware and software for future technologies that can better enhance the user experience.

Currently she is an undergraduate Support Assistant at the Under Graduate Learning Center in UTEP; where Karla serves as the Gaia Maker Space training team-lead, providing software training to classes as well as one-on-one trainings with students on various software that involve 3D printing, CAD/CAM Design, media production and web services, while also providing technological support to students and faculty with the UGLC's building and technology infrastructure for events and classes. Karla is also a part of the Tech-E program which exposes k-12 students to a range of emerging technologies through Project-Based Learning opportunities that prepares them for future career and degree choices in STEAM.

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INTRODUCTION

Traditional advising models have oftentimes become unwieldy, as institutions increase registration and counseling processes for students. These advising practices and systems have generally been constructed over a multitude of years but need to be revamped. While many are meant to guide students within their educational path; the reality of the current state of education requires new approaches to advising.

Academic advising, well developed and appropriately accessed, is perhaps the only structured campus endeavor that can guarantee students sustained interaction with a caring and concerned adult who can help them shape such an experience.¹ Many times, the traditional models have become merely procedural checkboxes that in essence have lost their connection to students; and no longer really connect advisors in a meaningful way with those students that they advise. Networked advising technologies have freed advisers from routine, bureaucratic tasks such as completing curriculum check sheets. They allow advisers to engage in the teaching and mentoring that is at the core of academic advising. Electronic degree audit systems eliminate the need for advisers to complete routine forms, and institutional databases afford advisers access to aggregate student characteristics and demographics.²

AD-VISOR is a next-generation advising approach coupled with technology-backed systems being designed to pull the procedural advising process out of the way, set it aside through automation, and to refocus advising on the connection between students and advisor.

Students and advisors were surveyed to see how the new tool has changed the advising process focusing on the key metrics of changing the speed of procedural processes required to register, connectedness to advisors before and after the process changed, and meaningfulness of the conversations that took place prior to and after the new system was implemented. The results of implementation and impact on students is presented herewith. This is the first phase of a multiphase process to assess the advising system as it grows and expands into an adaptable and living piece of the advising solution.

MATERIALS AND METHODS

Tackling the redesign of advising can be a daunting task therefore we started with what should advising be based on. “Academic advising, based in the teaching and learning mission of higher education, is a series of intentional interactions with a curriculum, a pedagogy, and a set of student learning outcomes. Academic advising synthesizes and contextualizes students’ educational experiences within the frameworks of their aspirations, abilities and lives to extend learning beyond campus boundaries and timeframes.”³ Utilizing these core concepts as the keys of academic advising, the focus was then placed on reviewing the processes that students specifically go through within the advising and registration process. This led to the identification of what students perceived as the greatest challenges to them in regards the process.

For the pilot of the newly redesigned advising process based on such feedback; we focused on our Engineering Leadership program. The criteria for this selection was: 1) the cohorts within the program were well identified and documented, 2) the program was smaller (80 students) and newer making it more flexible to adapt 3) the advisor(s)/faculty wanted to move to a three-pillar model which focused on a) advising, b) mentoring, and c) professional development.

A team involving four students from varying classifications, along with a student from a different department/college, was brought in to conduct focus groups around the challenges of the current advising process. Based on such, the team was re-aligned with the goal of conducting addition focus groups of students about what type of system would be more effective for them both technologically as well as process wise. The goal was for students to be able to follow a more individualized path through the curriculum utilizing advising as one tool to do such. Key individuals (program advisors, faculty, academic technologist, students) were brought together on a weekly basis to identify software and platforms that could fulfill the needs being identified through the focus group feedback.

From the above focus groups, meetings, and discussions the following areas were identified as key problems within the advising process:

- 1) Advising was seen as a programmatic process by students that held up the student registration process rather than an additive benefit to them providing reflection, mentoring, and professional growth.
- 2) The timing of the process was geared towards the class registration process and its deadlines and not the student's calendar of professional development. The current process takes place near the end of each semester when students are most focused on final exams, projects, and finishing up course work in general rather than their future development and growth.
- 3) Within the Engineering Leadership department, the department has grown and gained students and faculty with diverse interests and backgrounds. This has created an advising process that requires modifications to maintain the individualized feel that originally existed but was lost as the department size tripled and faculty schedules could not keep up.
- 4) Advising software needed to be highly adaptive, customizable, and cost effective for a smaller department with the ability to scale to larger deployments over time and support multiple departments.
- 5) The platform needed to be able to be exceptionally user-friendly and require minimal effort to maintain and support. It as well needed to allow key individuals beyond just what is traditionally thought of as IT to make system modifications and adjustments as department processes changed. A few key examples involved modifications of course sequences, cohorts, substitutions, etc. The reason given for such was that traditional IT processes did not evolve fast enough to keep up with the growing needs of a department.

- 6) The adaptation of the advising system needed minimal programming or coding knowledge and could readily be changed by a department student work-study, an administrative assistant, a program advisor, an academic technologist, or faculty.

Based on the above items, Wordpress was selected as the base platform to be used to adjust the advising process. The key reasons for this selection were:

- 1) Readily adaptable by all parties involved; limited technical skills required.
- 2) Key plug-ins exist at minimal cost to provide the needed tools to fix the identified processes. Cost wise the process was estimated at about \$300 a year to support and maintain.
- 3) Highly customizable and automated to fit dynamic and changing processes within a department.
- 4) Familiarity of the product by the majority of individuals involved

The new advising tool was deployed within a timeframe of about six weeks from the conclusion of focus groups and feedback portion of the project to the actual deployment and testing phase. The first cohort of students to pilot the program consisted of 88 students, all from the Engineering Leadership department.

Various methods were used to assess the effectiveness of the modifications to the advising process. The first portion dealt specifically with removing registration processes from the traditional advising and offloading such into an automated workflow. The key metrics looked at were:

- a) Amount of time students had to wait for advising/registration appointments
- b) Amount of time required for a student to fully complete the advising process
- c) Amount of time required to finish registration for the subsequent semester
- d) Number of students actively engaged with the advising process
- e) The time to notification of student changes and modifications to the registration/advising process (i.e. getting the word out to students about key changes or departmental course availability).

The second set of metrics were more attitudinally based and surveyed students about their feelings towards advisors and the advising process. Key areas focused on:

- a) What students felt about removing the registration pieces from the traditional advising process
- b) What student felt about allowing them to complete the registration advising process online instead on in-person
- c) What students felt about scheduling meetings with the advising team online instead of in-person for registration-specific questions
- d) Overall their feelings towards the new process as a whole.

A third portion focused on surveying students about the adjustment of processes and procedures specifically pre-advising questions that were deemed beneficial to advisors. Key areas focused on were:

- a) The addition of pre-advising questions to the process as a whole
- b) Question revolving around current workload
- c) Professional portfolios and resumes development
- d) Questions pertaining to internships experiences
- e) Questions that gauged the students' feelings about how they were prepared in general for their future.

The final pieces to the evaluation of the new system involved matching students' anticipated registration goals with follow through. As well as ease and flexibility of system to match the department's changes and processes was also looked at.

RESULTS

The results of introducing AD-VISOR into the advising process are broken down into three key areas to better understand how the system impacted each area.

The first area of focus was to remove the course registration process from the face to face advisor meetings. This allowed students the flexibility to offload registration advising into an online-guided process. The prior process resulted in advisors being seen as gatekeepers of course registration and hold release processes; rather than mentors.

During the 20th century, student populations increased in number and diversity. Curricula expanded, offering students more academic majors and courses, while at the same time student programs and expectations for co-curricular life increased⁴. Faculty roles and expectations also changed as faculty members at many institutions came under increasing pressures to research, publish, and serve their institutions as well as their academic disciplines⁵. Adding additional duties beyond what was seen as professional advising significantly slowed down the student registration process and overwhelmed advisors.

Prior to AD-VISOR, the estimated average advising window for registration took nearly two months for all department students to navigate through the various meetings, approvals, and hold removals in order to be ready for registration. There was no formal baseline data to compare such with, so the average timeframe was based on form signature dates/data that existed in regards and were compiled to provide us the best possible baseline. Conversations with key departmental personnel in regard to their experience with the process matched the prior advising form data to provide support for this baseline timeframe

The effects of AD-VISOR are immediately noticeable here as 84% of the students within the same cohort utilizing AD-VISOR were able to complete the process within four days. Focusing on the metric of the amount of time that students were required to wait for advising and registration appointments when utilizing AD-VISOR; we found that 78% of students were able to schedule a meeting with an advisor and continue their registration process in less than one day. The time it

took students to complete the entire process from starting it online to being approved for registration was on average one hour and twenty-seven minutes. It was found that all students would read notifications and messages sent by the AD-VISOR system within a 4-5 hour timeframe and more than 89% of the students within the cohort took some action on such notifications in under a hour.

The second set of key measurements for AD-VISOR were focused on student attitude and feeling towards such. Students were attitudinally surveyed in regard to AD-VISOR and a few key sample question results are listed below.

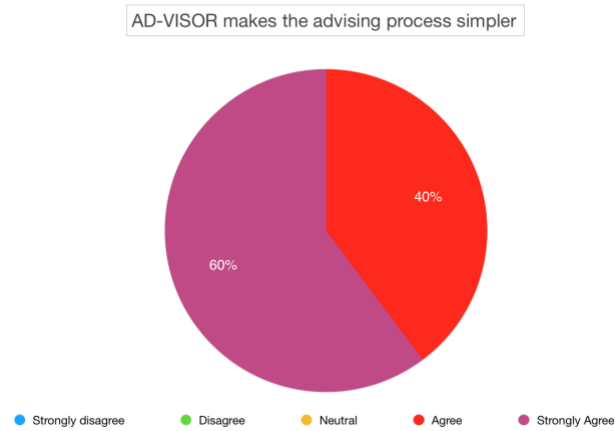


Figure 1. Student Attitudinal Survey – Sample Question 1

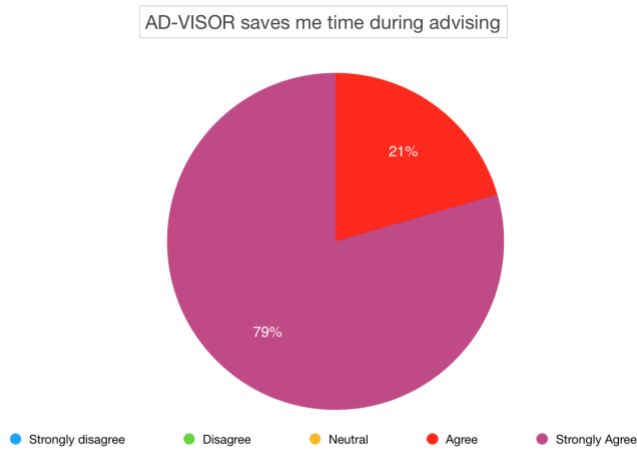


Figure 2. Student Attitudinal Survey Results - Sample Question 2

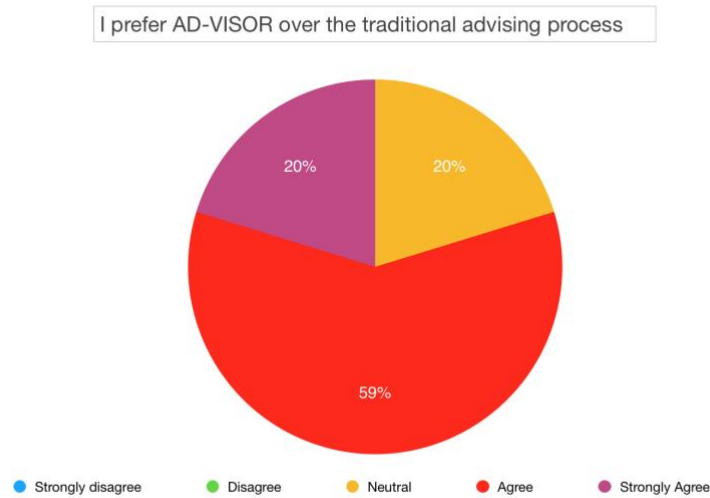


Figure 3. Student Attitudinal Survey Results- Sample Question 3

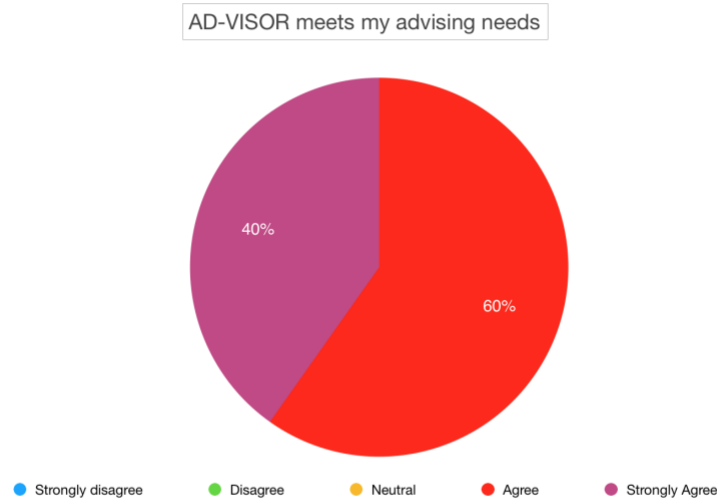


Figure 4. Student Attitudinal Survey Results Sample Question 4

All comments written in by students about the AD-VISOR process:

My experience with AD-VISOR was great I was able to organize myself and had clear dates of when I had to be done with deciding what to take. I like that it was easy to fill out and that there was an option to ask to speak to someone in person. I think it would be nice if it told you about when you could meet with someone and who the other advisors were, so you could obtain more help easily, instead of trying to match up available times.

I think that AD-VISOR is a great way of saving time, but maybe ones a year actually meet with the advisor in order for them to show us how our path looks

The User Interface was perfect and simple to use

It is awesome, very intuitive and makes advising much easier.

The registration process was simple and effective. An improvement I recommend is developing a way for a student to view their respective degree plan WITH sequence specifics, as well as emailing the student their respective advising form to print out or show departments when searching for department approvals for courses outside our home department.

The third set of metrics focused on process change and professional development. In this context, academic advising emerged as a way to help students plan their education, and in some places, became the role of professional advising practitioners.⁶ By separating career advising from registration resulted in two key workflow changes. First students saw them as two distinct processes and advisors were no longer gatekeepers to registration but were instead professional mentors. Second students started to make very different appointments both online and face to face to break the two distinct areas out into two separate topics not a merged one. Advisors were more informed and could personalize growth plan much better when they didn't specifically involving course requirements and enrollment goals but instead were focused around professional development areas.

DISCUSSION

In general, the implementation of AD-VISOR has proven to be exceptionally effective at reducing student wait time for course registration advising. Longer term monitoring is needed to ensure that such effects are not just immediate buzz about the system but are sustained outcomes over a multitude of years. A huge win already is the change of focus from advising revolving merely around just registration issues and classes to instead focus on longer-term student growth goals. This includes students themselves addressing such issues when scheduling appointments and seeing them as separate issues altogether. The full impact on obtaining pre-advising information and the actions advisors and students take on such still need to be measured over a multitude of years. However, such is a completely different topic and outside the scope of focus for the initial impact of the system on the registration advising process. AD-VISOR has met the needs to change the focus onto other areas of student growth beyond just registration. It is actually providing advisors with insights about student development on various fronts that they previously were not aware of. This has had a major impact on the advising process overall. It is shifting the focus back to what advising is defined as being and away from a procedural process it has become for class registration. AD-VISOR has also proven an effective way to reduce the student time spent on merely procedural processes. This in turn has reduced advisor's workloads specifically dealing with registration advising processes as many are now automated. Student comments and feedback point to the fact that the need for face-to-face advising remains but its focus can be heavily shifted from procedural advising to professional growth and path focused instead.

CONCLUSION

AD-VISOR has been highly effective at offloading the registration advising processes. However, it still needs to grow and develop to provide a full-fledged solution. The next step of implementation will be to continue to expand this successful pilot model to tackle paper-based models that interact with the AD-VISOR system. Academic advising within the department has been able to transition more fully to a professional development and mentoring process rather than a “what class should I take” and “do I have the prerequisites” model. This presents additional implementations and adjustments that AD-VISOR may be able to better facilitate in the future. Students overall support the offloading of registration based advising processes to the online system as it saves them time. AD-VISOR is also seen as equally effective as face to face models and creates more opportunities to engage with advisors on professional development issues. Part of this is from utilizing technology, but it has also equally created a greater segmentation of types of advising processes for the students. This has impacted their behaviors as well as those of the advisors to create now a distinctive registration advising process and a professional development advising process.

FUTURE WORK

AD-VISOR is currently being adapted to support cohorts within the College of Education and to include Masters students. These new cohorts will specifically test the ability of the system to adapt and grow beyond the College of Engineering and to support a wide range of needs in terms of advising processes. Additional paper-based processes are being looked at to be included into the AD-VISOR system to reduce departmental advisor time on such. A longer-term study is now planned for the impact on professional development models of students who are engaged with AD-VISOR in contrast to those that receive more traditional face to face and paper-based registration advising models.

Additionally, the system is being adapted to seek out student internships, scholarships, and jobs that match students interests and needs and present these to advisors for a more complete and cohesive advising experience to include all areas of a student’s needs. AD-VISOR will be undergoing additional changes in order to measure student’s follow through in the longer term; i.e. do they enroll and maintain (not drop/fail) classes as advised in order to generate predictive analysis of students anticipated enrollment goals vs real world enrollment trends. The goal of such is to allow advisors and department heads to identify roadblocks in advance so additional courses can be allocated prior to student registration timeframes.

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