

iTi MyCAA: Final Report: Strategic AI Plan for Using Automation to Improve Student-Support Operations and Student-Persistence

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EXECUTIVE SUMMARY

During summer-B 2019, the author (Project Director/Principal Investigator) completed the final report below---which includes the Scope of Work for the MyCAA multi-year project conducted at Florida Gulf Coast University with the sponsorship of the US Department of Defense's (DoD) MyCAA (Military Career Advancement Accounts) scholarship/financial/grant assistance program in partnership with MedCerts LLC and the Institute for Technological Innovation (iTi). As required, this final report also covers the research outcomes—including strategic analysis for using AI/ML/NLP to improve student-support operations and student persistence:

Scope of Work

Overview: The Military Spouse Career Advancement Account Scholarship (MyCAA) project consisted in the online support of military spouses in the MyCAA program/project (i.e., automated tracking of participants' progress, portal maintenance, automated alerts and reporting, management of resources, security/privacy for DoD Portal, communications with all stakeholders, participants and funding staff.)

Scope of Work: Outcomes

During Summer-B 2019, the PD/PI completed this final report for the MyCAA project of reference.

This final research report consists of the following outcomes:

1. Research, analyze and report about how Artificial Intelligence (AI), Machine Learning (MC) and Natural Language Processing (NLP) can be used to improve career certification training as well as how it would help further increase completion rates.
2. Finalize and report statistics on the number of participants in the project.
3. Finalize and report statistics on the number of completions.
4. Finalize and report statistics on the performance metrics.
5. Analyze and provide practical recommendations for customizing, individualizing and personalizing training via AI business strategies and technologies.

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The Critical Success Factor (CRF) for the iTi MyCAA project was the **completion rate*** (Table 1) attained by the participating military-spouses in the online certification-training offered during the duration of the project at FGCU.

Succinctly, the *project’s high completion rate (87.6%) was due to the consistent high-level of online support provided* (via Internet, chats, e-mail, VoIP, video, and other telecommunication tools) to all participants (i.e., military spouses) in this project/program.

Total Participants in the Training	3343
Successfully Completed Program	2930
*Completion Rate	87.6%
Attempted Certification Exam	598
Passed Certification Exam	424
**Certification Pass Rate	70.9%

Table 1 – MyCAA Participants: Completion Rate

Updated Background: Real-Time and Asynchronous Online Support Services: Can AI/ML/NLP Improve Student-Support Operations and Persistence?

As stated in the above executive summary, a high-level of online support was provided consistently to the **3,343 military spouses** (Table 1) participating in the MyCAA asynchronous online training program (i.e., on-demand videos and just-in-time assessments) offered during the duration of the MyCAA multiyear project at FGCU. *The participants persisted and successfully completed their training, because someone cared (an advisor, an instructor) about their success and was willing to give them one more call and one more opportunity!*

Although the training **completion rate** was high (**87.6%**), the institute was unable to require participants to take the pre-professional certification exam (provided by the third-party national certification agencies) once they successfully completed their training. Therefore, the result was that few military-spouses (approximately 20%**) took their pre-professional certification exam. Even though 3,343 military-spouses took and passed the required quizzes and qualification exams to obtain the Certificate of Completion at the institution. Of those participants that *voluntarily took their official pre-professional certification exam*, about **71% passed their exam and became certified**. At this point, there is still no official requirement to take the pre-professional certification exam offered by agencies. In addition, due to privacy issues, it’s not possible to collect information about employment, after completing the training and exams. Therefore, employment data on MyCAA participants is no available to the investigators (i.e., data cannot be obtained from the funding agency, due to confidentiality issues.)

Participants were strongly encouraged to take advantage of the variety of services offered by the MyCAA Project Support Team (MPST). As detailed below, MPST delivered

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impactful, professional, and results-driven support services, beyond what is normally provided by other institutions (i.e., online 24-7 vs. the traditional campus 40- to 60- hours per week).

Below are the services that were available to each of the 3,343 participants. Basically, the partners, in coordination to the Project Director, created a series of timed/scheduled outreach points that were designed to notify participants of their progress---keeping them engaged all the time. If a participant felt out of pace (from where they should have been on the training), the participant would at the very least receive a phone call and an e-mail. And, for those with severe academic deficiencies, they would receive an advisor consultation where a new course schedule was designed and agreed upon based on the needs of the participant.

GENERAL PARTICIPANT SUPPORT

Proactive

- New Participant Online Orientation – Private one-on-one phone orientation required for all participants
- Private Student Consultations – Based on need or request, all students had the ability to self-schedule an appointment for consultation with an advisor, if support or guidance was needed.
- All participant progress was monitored and reported to Participant Services on a DAILY basis.
- Scheduled Outreach – Timed outreach – Participants were contacted at scheduled intervals throughout training regarding their program progress/status.
- Remedial Support – Participants who were identified as “deficient” in progress were provided a phone consultation with an advisor. A revised schedule or custom learning plan was developed based on participant need.
- In-Activity Monitoring – If no activity for extended period of time, an “outreach” by phone/email occurred.

Reactive

- On-Demand Toll Free Phone Support
- On-Demand Email Support
- Certification Exam Registration and Scheduling Assistance
- Registration and delivery of program-specific certification Assessment module

SUBJECT MATTER SUPPORT

- On-Demand Chat with a Live Subject Matter Experts who hold one or more industry degrees and certifications
- One-on-One Tutoring – Based on need, or by participant request
- Assistance navigating the many resources provided to supplement the video instruction

EXAM PREPARATION SUPPORT

- Detailed exam preparation plan upon completion of their program.
- All participants received Exam Preparation Manuals for all eligible exams.
- Private one-on-one phone consultations (Exam Preparation Session) with a Subject Matter Expert to review key objectives, study/exam tips, and to provide additional resources to best prepare students for certification success.
- A dedicated Exam Registration Specialist helped each student with the pre-registration process, identifying a testing location, and served as a guide during each student’s path to exam day.

TECHNICAL SUPPORT

- Dedicated Tech Support to assist with video troubleshooting, software installation, browser issues, etc.
- Creation/Delivery of custom troubleshooting & FAQ video modules
- Available by phone, email, and chat with remote screen-share support capability

iTi MyCAA: AI/ML/NLP Strategic Analysis

Summary

iTi MyCAA has been **providing, low-cost, personalized career certification training programs** to world-wide job-seekers, mainly military spouses---while their partners are on active duty. To deliver its online courses and consistently-support participants/students, ITi MyCAA developed an strategic plan to **deploy a new AI-based, Learning Management System (ai-LMS)** as well as an adaptive learning video-content training app using AI-enabled SaaS cloud platform. The new system and app would replace the current time-consuming manual operations (i.e., registration, fee-collection, content-creation, content-delivery, assessments, constant feedback, and so on). **To minimize the impact of the AI transformational process** (which will take 6- to 24-months) and to reduce capital outlays; initially, routine operations will be outsourced to external advisers/mentors/experts/marketers under the supervision of the program director (Prof. Walter Rodriguez, PhD, PE) ---who obtained the initial multi-year, multi-million-dollar grant-funding (i.e., financial assistance) from the government (DoD) and private industry partners. Now, ITi MyCAA is seeking to quickly scale operations and marketing efforts, provided it obtains support from the university and the DoD.

ITi MyCAA AI Strategic-Implementation Plan for (1) attaining ITi MyCAA's cost-leadership/focused-personalization strategy; and for (2) quickly expanding operations and offerings with minimal human intervention, consists in *seeking to automate all processes and leverage AI technologies—including ML, NLP, robots, by extrapolating or inferencing from Porter's, Kotter's and Ng's transformational frameworks*. **Advisers/mentors would continue to use their core competencies** (i.e., designing individualized courses and supporting at-risk participants) while being liberated from the routine administrative and clerical tasks. **By developing and implementing AI (machine-human) symbiotic collaboration and technologies**, ITi MyCAA would be able to save both time and money as well as add-value to all its stakeholders (for instance, liberating advisers/mentors from routine tasks). **ITi MyCAA would become a smart enterprise** by attaining the flexibility of a small/nimble organization---while seeking the economies of scale of a large organization, as recalled from strategy thinkers (i.e., Applegate, Porter). The following developments and processes will provide **"economies of scale" and quick-scalability** as well as efficiencies and productivity gains with fewer workers: (a) **24-7 Smart Receptionist/Sentry**; (b) **Robo-RA/TA**; (c) **Telepresence Customer Support**; (d) **Smartly-trained Customer-Service AI/Robot**; and (e) **AI-LMS and adaptive content delivery as well as participant success-tracking**, in support of ITi MyCAA low-tuition and focused adaptive/individualization/personalization strategy. **Justification:** While ITi MyCAA currently has a relatively high-completion rate (87.6%), it has been due to the persistent and consistent high-level of online support provided (via Internet, chats, e-mail, VoIP, video, and other telecommunication tools) to all participants (i.e., military spouses). However, **this is very labor-intensive process that might be aided with a smart partnership between advisers/mentors and AI tools and strategies.**

Current state

ITi MyCAA has been providing, no-cost to low-cost, personalized career certification training programs to world-wide job-seekers (mainly military spouses---while their partners are on active duty.) **To design, deliver, and support these online courses world-wide**, ITi MyCAA developed and deployed both a mobile app and a Learning Management System. These app and system reside on the Cloud (Amazon Web Services) servers. And the online courses are accessible 24-7 from the participants’ mobile devices via cloud computing technologies and a video-trainer, ubiquitously---anytime, anywhere. **To assist with the online course delivery**, ITi MyCAA currently uses LMS, e-mail and telecommunications to coordinate all activities—including recruiting, program design, assessments, and advising. For instance, it uses e-mail to: (1) coordinate with third-party providers—including specialized marketeers that identify prospective participants; and (2) coordinate with the various third-party video training providers. Further, it uses the LMS to create and post course-content and interactive learning activities. ITi MyCAA’s mentors/advisors assess all prospective participants and prepares an individualized plan-of-study for each participant seeking a job in the healthcare or technology industries.

ITi MyCAA is currently hindered by low-productivity and inefficient communication strategies. And it’s seeking partners, DOD government support and venture capital to develop and deploy artificial intelligence tools & strategies, in order to assist in the assessment and automated preparation of the participants’ plan-of-studies as well as supporting participants 24-7 (with minimal human intervention.) **As a no-cost or low-cost provider of individualized online career certification programs**, iTi MyCAA focuses its core-competencies (i.e., course design and personalizing a career-path based on the participants’ background.) ITi MyCAA have been pursuing both “cost-leadership” and “focused-individualization” strategies that could be aided by AI: that is, low-cost courses and focus on mass individualization/personalization of programs.

Currently, ITi MyCAA is seeking to use AI technologies to improve process efficiency and productivity. This seems to be fully consistent with a dual cost-leadership/focus strategy, since a partnership between advisors/mentors and AI can make this possible. Of course, ITi MyCAA would still choose to emphasize cost-leadership, while using AI-human-computer assisted tools for generating both personalized programs and predictive analytics. The implementation will fit ITi MyCAA’s hybrid strategy, by *leveraging both (a) innovative AI technologies to augment operations; and (b) experienced advisors/mentors*. By freeing the advisors/mentors from all the daily tasks, the hybrid strategy will bring new added-value to ITi MyCAA stakeholders. **AI predictive tools and strategies** will assist ITi MyCAA in improving participants’ persistence and completion rates in the program (Table 2), given that a significant number of participants tend to drop from the program (or do not take the certification exam) without constant adviser/mentor intervention.

Table 2 – Participants: Completion Rate

Total Participants in the Training	3343
*Completion Rate	87.6%
**Certification Pass Rate	70.9%

Proposed AI initiative for ITi MyCAA

ITi MyCAA is proposing an innovative multi-faceted AI initiative to benefit from using AI MC, NLP and robotics--by combining humans (advisers/mentors) with autonomous robotic functionality (i.e., more than one function) on the following organizational-processes: (1) 24-7 Receptionist/Sentry: A welcoming (anthropomorphic) robot at the reception desk to both “screen” and “safely” protect and direct visitors to the correct individual [Note: In the time of mass school shootings in Florida]; (2) Just-in Time Lunch Delivery: Take orders and bring warm meals to employees’ desk--exactly when they are going to be hungry based on MC-learned and sensing employees’ habits and patterns; (3) On-demand self-driven car-robot: Based on known employees’ schedule/calendar, alert, pick-up and drive employees to the airport or other destinations as needed (per online calendar); (4) AI-Robo-RA/TA: A personal AI research assistant/teaching assistant to help with the on-site computer summer labs communications and preparations; (5) AI-LMS and adaptive content delivery. And, finally: (6) AI-Telepresence-Customer Support: A well-trained Customer-Service (CRM)/Marketing AI/robot will accompany ITi MyCAA’s salesforce or advisers and perform routine administrative, communications and marketing tasks while on the route and upon arrival at the site (i.e., military base). Pursuing ITi MyCAA’s vision and core-competencies (i.e., design and deliver on-demand (24-7) personalized career certification training to anyone/any place at the lowest possible cost), we will deploy multi-purpose AI robots to support both the focus (personalization) and cost leadership hybrid strategy. ITi MyCAA will be able to save both time and money as well as add value and convenience to all its stakeholders (i.e., free them from routine tasks). The processes described above will provide “economies of scale” as well as quickly “scalable” efficiencies and effectiveness. This will be an improvement beyond our current telepresence robot environment (i.e., the telepresence “anybots”.) The hired **Chief AI Officer (CAIO) will have the additional role and duties of collecting and assuring the “underlying (AI) requirement (e.g., data availability)” as well as the data required to train the AI/ML/NLP-powered robots.** Of course, the CEO/Chief Innovator Officer (Dr. Rodriguez) will ensure that ITi MyCAA will have access to a sustainable funding source while developing the integrated AI/CRM/ERP information systems. Pursuant to ITi MyCAA well-fitted robotic initiatives on both business strategy and IT strategy, the **“increasing persistence/retention” goal will be supported by the CEO/Chief Innovation Officer, i.e., “ped KPIs (e.g., achieving a 10% decrease in students dropping a particular course”)**. Regarding the technical considerations, it would be necessary to have reliable information systems (i.e., databases etc.) as well as a robust IT/AI infrastructure (i.e., networks) sustaining/supporting, mobile and cloud-computing technologies from AWS or Microsoft or other cloud vendors. Further, we would need to identify training examples. Once identified, the remaining ‘learning’ process is essentially (I think) a computational problem that would not necessarily directly involve more people. Of course, having access to faster machines/processors (newest Amazon’s MC chips?) that can effectively ‘learn’ faster will be advantageous. Further given that servers will run data analytics and other intensive processes, the 24-7 data center will have to be very robust and reliable. Finally, in evaluating the hardware platform vs Infrastructure as a Service (IaaS), we would need to consider: (a) the need for specialized inferencing hardware; (b) determine the “floating-point” performance (the real, rather than peak) when the system calculations are governed by memory and cache bandwidth performance; (c) analyze many-core or massive parallelism needed to train ITi MyCAA’s large data sets; and (d) research reduced-precision data types (i.e., niche optimization.) ITi MyCAA has identified and will develop the following AI NLP/NLG processes for implementation—in order to seek greater automation in support of our hybrid cost-leadership and focus (mass personalization) strategies:

- a. **NLP Sentiment Analysis:** By implementing “sentiment analysis” algorithms and apps, ITi MyCAA will be able to automate the extraction of meaning (or making sense) from hundreds of emails and voice-mail messages received, on a daily basis, asking about the DoD MyCAA scholarship. Although the “emotion” in the communications are not explicitly stated (but somewhat implicit), an extraction via sentiment analysis might serve as a competitive edge, since our competitors in the career certification training business are fairly behind in the application of AI NLP.
- b. **NLP Information Extraction:** By automatically extracting and structuring data from unstructured text messages or pixelated images, ITi MyCAA will be able to “extract” data (i.e. entity extraction), such as names, addresses, course fees, locations, etc. In addition, could use “fact extraction” to supply ITi MyCAA participants’ spreadsheets and databases with the structured data and information. By automating this process, ITi MyCAA will pass-on the cost-saving of automation in support of cost-leadership as well as feed social media marketing initiatives.
- c. **NLP Semantic Search:** Semantic (smart) searches will allow the ITi MyCAA site to address complex questions automatically, rather than wait for an advisor/mentor.
- d. **NLP Automated Reply to Questions (or QA):** Implementation of chatbots will also save time and money for all stakeholders, in support of our cost-leadership and focus strategies—particularly, mass personalization. In addition, NLP-powered customer support chatbots, will permit understanding of the participants’ questions and logically reply to the message originator (i.e., potential trainees). Further, it will streamline basic administrative operations, such as, financial aid processing, invoice processing and so on.
- e. **NLP to Keep Advisors/Mentors Interested:** Rather than spending lots of time in routine or monotonous tasks, advisors/mentors will be more efficient, effective, productive, and creative. So, it might help improve performance and moral as well—by freeing advisors/mentors to address personal issues presented by at-risk participants.

In this way, ITi MyCAA would be able to reduce the cost of the training, while being able to mass customize, adapt and personalize career training certification programs.

iTi MyCAA: Plan of action and criteria for success

Objective: If approved and funded, *ITi MyCAA AI initiative would automate most current business communication and processes by developing and implementing AI ML/NLP/Robotics coupled with ai-LMS/CRM/ERP/BPE systems.*

[“From predicting drop-out rates of participants to personalizing product offers to predictively improving product performance to supporting customer segmentation and target marketing to visualizing data for pragmatic decision-making ... to implement smarter, automated processes that can liberate staff time for increased focus on core operations and user experience.”]

Key Results/Key Performance Indicator: Ultimately, we will “... peg KPIs (e.g., achieving a 10% decrease in students dropping a particular course).” And pursuant to Google’s OKR framework.

The ITi MyCAA founder with the assistance of a Chief AI Officer (to be hired) will lead the implementation of the proposed AI initiative. While the founder will set the overall business strategy and seek funding, the CAIO will hire IT/AI staff or outsource the development of the integrated AI applications and vendors. [Of course, funding permitting, we will start to develop our in-house AI team, as suggested by Andrew Ng in his AI Strategy writings.]

The technical considerations and requirements for deploying and implementing ITi MyCAA AI will involve developing/refining an IT/AI Strategic plan, following *Kotter's and Ng's* recommendations, as well as a clear connection between ITi MyCAA business-value for all stakeholders and the AI technologies to be implemented. This will be governed by the current in-house technical limitations and our ability to attract investors and AI developers. The key factors will be: (a) assess the outcomes that would benefit the most from AI; (b) analyze the most suitable AI technologies available from vendors; (c) match outcomes with the technologies; and (d) plan for key use cases and best implementation practices. Of course, as suggested by Brian Charles, “*underlying* requirement (e.g., data availability) in considering the tech requirements ... and beginning to peg KPIs (e.g., achieving a 10% decrease in students dropping a particular course) might be useful for you to begin considering.

Methodology: Using a modified SDLC (System Development Life-Cycle) model, the technical development and implementation process may be conceptualized as:

[**Define AI strategy**] > [**Prepare Data & Evaluate** (concomitantly with AI Business Case Selection)] > [**Assess AI Vendors** (concomitantly with **Performance**)] > [**Develop AI Pilot and Experimentation**] > [**Production/Implementation** (concomitantly with **Evaluation**)] > [**Cycle back to Re-defining the AI strategy.**]

To have the best chance of success (and avoid pitfalls), ITi MyCAA AI Plan-of-Action will follow Kotter's (1996) and Ng's (2018) recommended transformational stages, as well as the insights gained from the MIT AI Strategy course. And will evaluate staff results using **Google Objectives and Key Results** (OKR) framework.

Below are the actions needed for leading the iTi MyCAA AI transformational change:

- I. Using Porter 5 Forces Framework, re-examine the Career Certification Training market to **discover untapped opportunities** and avoid surprises. And I reevaluate and reconfirm the generic cost-leadership/focused personalized strategies with stakeholders.
- II. Hire a Chief AI Officer (CAIO) to lead the AI development efforts and research the companies and partners that might be able to assist us in leading the transformational efforts. In addition, s/he will **propose a fast-track schedule (time-line) for completion of an AI Pilot** that can be completed in 6- to 24-month using state-of-the-art project management software.
- III. **Since students/participants' data is a Critical Success Factor (CSF)-asset for ITi MyCAA**, we will **develop an AI Strategy** specific to the career certification training industry. And to create value ITi MyCAA will establish an **amalgamated data warehouse** to share data and glean information across the organization as well as **distinguish truly valuable data** from non-valuable or low-value data.
- IV. As proof-of-concept, the CAIO will conduct the first **AI Pilot project** in a feasible area where ITi MyCAA has the most opportunities to gain, for instance, "sentiment analysis" algorithms and apps, ITi MyCAA will be able to automate the extraction of meaning (or making sense) from hundreds of emails and voice-mail messages received, on a daily basis, asking about the DoD MyCAA scholarship. Further, as Brian Charles indicated "... **deploying NLP for conducting sentiment analysis ...**" **will be our #1 pursuit**: "in information extraction, in semantic search for addressing website queries, in QA and in maintaining the interest levels of advisors/mentors by alleviating their rote work."
- V. In a concurrent, **second pilot project ITi MyCAA will develop an AI-based Learning Management System (ai-LMS)** as well as an adaptive learning video-content training system using Cloud services and mobile apps by improving upon its current systems.
- VI. Refine ITi MyCAA's vision, in order to **align organizational support structures with our core competencies** (i.e., designing and delivering personalized programs.)
- VII. **Clearly communicate ITi MyCAA vision** (i.e., automating all processes, in order to attain the cost-leadership and focused-personalization strategies) to all stakeholders as well as the need for spending the current capital and resources on AI automation.
- VIII. **Remove the current outdated (non-automated) online registration** and video training systems that are hindering the successful implementation of the AI low-cost/personalization strategy.
- IX. In coordination with the CAIO, the CEO help **re-engineer the performance improvements**, so that we can implement the AI/advisers/mentors symbiotic and synergistic collaboration as quickly, productively, efficiently and effectively as possible.
- X. As CEO/Chief Innovation Officer, in coordination with all stakeholders, will develop and **implement the policies needed to grantee that AI systems will be properly supervised** by humans to prevent ethical/privacy/security issues. And I will hire and re-train employees, so they will lead the advising/mentoring processes, based on their experience helping participants/students.
- XI. The CAIO, will recruit and build an **in-house AI team and institutionalized AI training**. This training will be conducted by the CAIO in coordination with the CEO and outside consultants. **Over 8-hours per week, will be allocated for training**, since the AI field is advancing very quickly.
- XII. A recruiting/talent company will be used to **continuously seek smart, ethical, sensitive and talented individuals** that have a proven record of working both with people and machines. And assess and measure staff's project accomplishments using

- Google's OKRs.
- XIII.** Finally, in the initial pilot projects, ITi MyCAA will seek to continue **building technological assets that are difficult to emulate** but are closely aligned with ITi MyCAA strategy in its niche market (career certification training).

MyCAA: FINAL RECOMMENDATIONS

Summary: Ubiquitous learning modalities, like mLearning, have the potential to transform training/education accessibility, delivery, and student/participant-support for military-spouses or anyone in a transient military family with a smartphone. But, while these innovative technologies and associated pedagogies have created new opportunities to acquire knowledge, engage participants/students, and track & assess learning outcomes, deciding to implement mLearning for delivering fully-online mobile MyCAA programs needs further analysis. mLearning could potentially create organizational/institutional havoc if sufficient instructional- and student/participant-support are not provided ubiquitously, in a timely, effective, and efficient way. Rather than exulting mLearning flexibility and convenience, this study analyzes the drawbacks and challenges, such as low student/participant-persistence. Suitably, the report also presents mobile app constructs for facilitating student/participant-support and student-faculty-advisor engagement. Although strategies and functional design-requirements are presented, the app system-development and implementation are beyond the scope of this report and it will be explored next summer, as part of completing the MyCAA project.

Mobile Learning Challenge for Transient Military Spouses and Students

“Nearly two-thirds of college students use their smartphones to study, and the global market for mobile learning is projected to grow by 36 percent annually. Colleges are experimenting with ways to engage students in and outside of class through their phones.” (Chronicle of Higher Education 2018)

While ubiquitous-learning delivery modalities (Beckmann 2010), such as eLearning and mLearning (i.e., using mobile devices for gaining knowledge, engaging students/participants, and tracking & assessing learning outcomes from anywhere) provide tremendous flexibility and convenience for online learners, if the offering institutions do not provide robust, engaging online participant/student-support, as the Institute and partners did during the multi-year MyCAA project, these students may be quickly inclined to abandon or drop these online or mobile courses without seeking help from advisors, faculty, and campus staff support. To wit: A massive number of MyCAA participants, students, particularly online and mobile/transient students are taking longer to complete their degrees and, unfortunately, many never graduate for a variety of student and institutional characteristics enumerated later in this section (Faas, Benson, Kaestle, Savla 2017).

Research previously published in a peer-refereed journal investigated the effectiveness of ubiquitous (online, mobile learning) environments (Schwartz, Peterson, Rodriguez 2017). And earlier technical research---focusing on the actual development and implementation process of a *non-commercial* experimental mobile app (Rodriguez et al. 2015), discovered the “persistence” challenge that will be presented in this report. [Hint: As discussed in the executive summary, it was not all about the technology but about the level of service and participant support provided.]

“The main drivers of innovation in higher education are not simply a function of what is technologically possible; they are—or should be—a function of pedagogically sound and cost-effective strategies that advance our institutional missions in ways that best serve our students, are fair to our faculty, and advance the interests of our communities.” (Committee on Institutional Cooperation 2013)

Figure 1 illustrates the user-interface of an experimental app, labeled “ITi MyCAA” that was developed as part of the MyCAA project. During the three-year beta-testing of this mobile learning app, it was realized that participants/students were being challenged by issues not necessarily related with the technology itself but rather to online (off-campus) support, after traditional business hours.

This academic experimentation helped identify the fundamental fault of focusing on technology alone (see above quote). The prevalent issue, while beta-testing the app, was the lack of participant/student persistence and the resulting high dropout rates from learners that didn’t *proactively seek human assistance* in a timely manner (i.e., advisors, instructors and support staff), beyond the lessons, forums and programmatic self-help and video-linked tutorials provided via the experimental app (Figure 1).

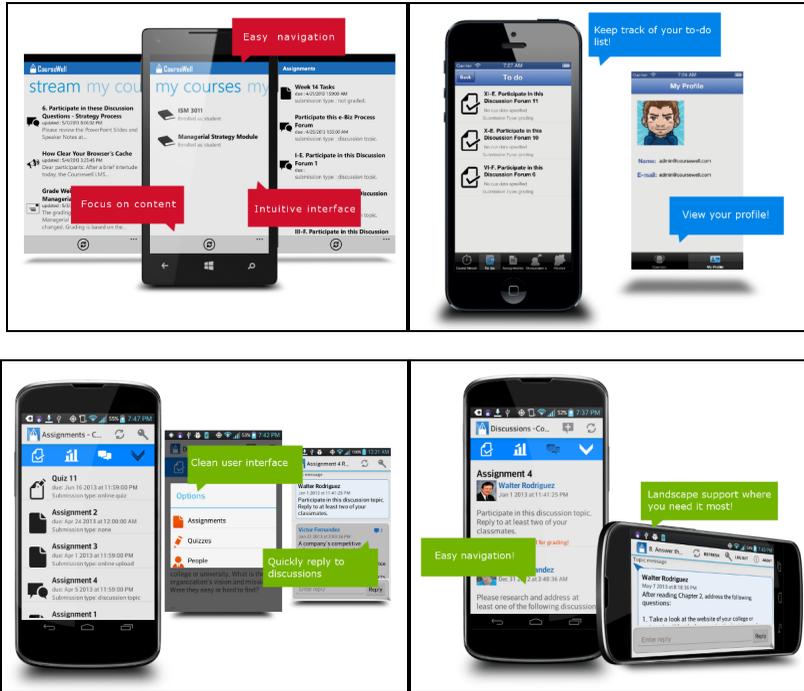
But this is not the only experimental app trying this mobile cellular approach. Additional institutions are now developing software apps to allow students to engage with faculty and their peers. For instance, one app, labeled “Hotseat,” lets students ask questions, take polls, and facilitate (backchannel) in-class discussions (Chronicle of Higher Education 2018, pp. 31). Although these apps may help with engagement and student retention, they don’t solve the persistence problem by themselves. And there lays the complexity of the problem.

Problem: Low Participant/Student Persistence

Although generally focusing on online, mobile learning, this report first examines the generalized problems and challenges that most participants/students are facing, regardless of delivery modality (online, mobile, hybrid and on-campus). And then provide recommendations, solutions and app design-prototypes (i.e., user-interface, sample menus, mockups) to help minimize the potential impact of studying remotely, i.e., away from on-campus student support structure, via mobile devices.

Two characteristics are analyzed, namely, student characteristics, and institutional characteristics. Alternative solutions are presented to increase the students’ retention and completion rates. And to help students find a balance between work and study. One of the solutions consist in developing a robust and cross-functional mobile-learning application prototype to address the key issues and dimensions of well-being impacting students’ persistence in vocational training and college, particularly, online/mobile students.

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This figure shows the user-interface and interactive features of an enabling non-commercial experimental technology, named “ITi MyCAA.” The software was developed by undergraduate students and faculty and consisted of natively-designed apps and systems. It was developed specifically by the project director and his collaborators as an experiment for enhancing ubiquitous forum discussions and student-faculty-advisor interactions via mobile devices. [ITi MyCAA is an initiative of Florida Gulf Coast University’s Institute for Technological Innovation.]

Figure 1. Non-Commercial Experimental mLearning Software App (Rodriguez et al. 2015)

Research indicates that fully-online students (including vocational schools, community colleges and massive open online courses) have lower completion, graduation and persistence rates than traditional or fully on-campus students. And, not surprisingly, mobile students face the same types of issues as their campus’ peers. Nevertheless, the data is extremely complex to analyze and the issue is still being debated among eLearning scholars (Haynie 2015). To understand the complexity of the problem (or challenge) at hand, a study done by the National Longitudinal Study of Adolescent to Adult Health examined college dropouts as well as graduates on their socioeconomic success and mental health profiles. This information was examined in five dimensions of well-being: (1) socioeconomic success indicators; (2) happiness/satisfaction; (3) mastery; (4) stress, and (5) depression. The results indicated that college students who dropped out of college ranged significantly on a chart of these five dimensions of well-being. There were many different types of groups investigated—including participants: (a) who averaged out on the list; (b) had higher income with less stress; (c) had higher income with high stress; (d) low income and low stress; and the list goes on and on (Faas, Benson, Kaestle, Savla 2017). Further, students’ well-being is not simply based on their financial situation but also includes subjective well-being including emotional contentment. Students should be understood as complex beings. Therefore, when assessing dropout rates at institutes and universities, it is most important to understand that there is no simple programmatic solution. Nevertheless, technical solutions (i.e. mobile apps, deep-learning) as well as big data and

predictive analytics may help anticipate issues and design ways to address the problems before it's too late (McMurtrie 2018).

Reasons for Dropping Out: Evidence: According to the National Center for Education Statistics the 6-year graduation rate for first time, full-time undergraduate students at a 4-year degree-granting institution in fall 2009 was 59 percent (The Condition of Education 2018). [The six-year completion for fall 2011 was 57% with some underrepresented minorities critically falling from 27% to 18% below that statistic (McMurtrie 2018).] With students dropping out of college, academic administrators and faculty are faced with a question: *How can we minimize student dropout rates and maximize student persistence?* Colleges are concerned with the high dropout rates and many schools have discovered ways to increase the retention rate for at-risk students by flagging (identifying) students, providing in-class tutoring and re-designing curriculum pathways for those students.

Public and private non-profit are quite similar while private for-profit shows that less than thirty percent of men and women graduate through their institution. With this understanding, it's important to analyze how other schools have been able to increase their graduation rate and look at some ways that schools may be able to increase their graduation rate as well.

In 2015, for instance, the six-year graduation rates at a regional university fell to 42.9% (Bland 2016). This statistic caused great disappointment at the institution and a more detailed investigation about the problem was conducted. The research looked at “figures from five, six-year periods—2005-11, 2006-12, 2007-13, 2008-14, and 2009-15—which showed that on average about two times as many full-time students dropped out than transferred (Bland 2016). While this statistic is heartening, a look at this university's graduation rate compared to nationwide schools, shows the problem even runs deeper and wider in the USA.

Students drop out for numerous reasons. There are two big reasons why students drop out. The two groups are (1) student characteristics and (2) institutional characteristics. Student and institutional characteristics can lead to students dropping out (Chen 2012). The two categories will be broken down in further detail in the next two sub-sections to see how each impacts a student's decision on dropping out of college.

Student Characteristics: Student characteristics are just a factor into the reason why students drop out of college. These are the reasons that they feel personally and can be the factor of whether to stay or not. A study was done to find the characteristics that cause students to drop out and the problem has persisted for decades, for instance, a “review of twenty-five years of research on college student dropout identified the following variables that are related to dropout: (a) demographic, (b) academic, (c) motivational, (d) personality, (e) college environment, (f) financial, and (g) health” (Pantages & Creedon 1978; Mashburn 2001,174). First, is academics. Students find themselves merely struggling in classes or are not understanding it. Some are unable to handle all the freedom and may be skipping class or not completing their homework and assignments in a timely manner due to work or family issues. Instead of putting an effort when they see themselves slipping, most give up leading them to drop out. That can coincide with motivation. Another reason students drop is demographic. Demographics relate to age, gender, and race/ethnicity (Chen 2012). Students might feel out of place or do not have a lot of students that are like them (i.e., gender or race/ethnicity). And may consider transferring or drop out as they are not getting the social or cultural support. One of the biggest reasons students drop out is because of financial reasons. Students will find that college has become too expensive and dropped because they can no longer afford it. Sometimes, it's as simple as not having money to purchase textbooks. [More and more, this problem is being addressed by simply offering free, open source materials.] Further, an increasing number of students have a part-time or even a full-time job and, simply, have difficulties regulating family-fun-work-study time in order to complete their homework on time, since work is taking up all of their time. But these are not the only reasons why students drop out.

Institutional Characteristics: Students may also dropout of college because of institution characteristics. Institution characteristics covered in a model are “institutional demographics, structure, faculty resources, and financial resources” (Chen 2012, 492). Financial reasons are also part of institutional issues. Adequate institutional funding and resources are a big part of retaining students. If the institution does not have enough resources and funds to provide services to keep the students active and bettering themselves, problems arise very quickly. Also, the institution might not be able to afford certain academic or training programs or majors that students may be interested in or they change programs too frequently—increasing the number of years to graduate. Further, if they choose a major or specialization that they might not be interested in, they might not be motivated enough to persist in their degree or certification program. Another reason is faculty-advisor resources. If the advisor or faculty does not have the resources they need to help the students/participants, they will easily fall through the cracks. The faculty/advisor might have too many students and might be unable to get to know all their students. So, they might not be able to see if a student is not doing well or monitor and provide alternative assignments if the student is having difficulties on a subject. One aspect is that “the dropout risk fluctuates by year, but the highest is in the first year (17.7%)” (Chen 2012, 495). Though the first year is the highest, students can still drop out in the next couple of years. This study looked at first-year institutions; it did find that the dropout was higher for least selective public universities than those of any other kind (Chen, 2012 495). This fact could be applied to colleges and institutions where the acceptance rate is high. A pattern that may increase as fewer students pursue college after high school. With the acceptance rate being high, it’s possible that some students who did not meet traditional academic standards may get accepted into the school, i.e. high-school prerequisite courses (Woods, Park, Hu, and Bertrand Jones 2018). Many students get accepted who might not have the adequate academic preparation, such as colleges serving a population where high-schools are not as demanding or are lagging behind in resources. One factor that institutions fail to recognize in a timely manner is “the responsibility for acculturating and supporting students throughout the educational experience which might be relegated to non-academic personnel (Stevenson 2007, 141-142). With non-academic staff being in charge of that responsibility, they might not fully understand or deeply analyze the complexity of the issues at hand. The university needs to change its views. Consider this question: *Faculty being the most likely point of contact, shouldn’t they be directly involved with student retention and persistence with adequate support?*

Low graduation rates are by no means an uncommon occurrence. Schools across the nation are facing the same dilemmas, and all have attempted to implement their own solutions. From a long-run point of view, completion, graduation and retention rates have not changed very much in the last century. According to the *Journal of College Student Retention*, over the last 118 years graduation rates have been relatively steady (Boden, 2012). Based on the study, retention rates have overall increased by 1.2% from the first year of college to the second. In addition, the study found that the graduation rates have not changed significantly over time to suggest a long-term trend. According to College Factual (2018), one regional university in Florida has a higher first-year retention rate than other universities in the state, but still it has a 52.5% six-year graduation rate. Why is that? Would it be due to aspirational reasons, where students may register at a lower-tier college and transfer to a higher-ranked college, during the second year? What can be done to retain those first-year students? (DeNicco, James, Neeta Fogg, and Paul Harrington 2014).

Analysis and Solutions: Engaging a Community of Mobile Learners

Overall, graduation and retention issues can stem from several different factors. These factors include: lack of adequate academic preparation; personal problems; work-study scheduling; and

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financial challenges, among many other issues. Table 2 offers some sample issues and practical solutions for online, mobile learners, as well as for the student population in general.

Table 2: Issues and Solutions for Preventing Dropouts

	<i>Academic Preparation</i>	<i>Financial Resources</i>	<i>Work-Study Balance</i>
<i>Problem</i>	Inadequate preparation for the rigor of college, either due to poor high school education or difficulties adjusting to the college workload.	Students and their families may not be able to afford to pay for tuition and books.	Many students are unable to regulate and balance work, life, fun, and study into their schedules. Students may not possess basic time-management skills or are simply working long hours (part-time or even full-time.)
<i>Solution</i>	Offer online tutoring-mentoring (provided by work-study students or retirees); create and offer personalized, and alternative assignments; require to complete prerequisites before each difficult assignment; and offer online/mobile prep learning opportunities for students that may be identified as at-risk.	Increase financial assistance and initiate micro-financing accessible to students from low income families or provide mini-scholarships for work-study students.	Provide online/mobile time management tools and just-in-time tutorials. Also, an interactive application that can assist students manage their time more effectively. Track and intervene, based on timely data about the students' progress, performance and outcomes.

Source: Lystad 2018

Online Mentoring/Tutoring and Realtime Tracking on Learning Management Systems

Nowadays, most schools use Learning Management Systems (LMS) to support most, if not all, of their course offerings—even if these courses are taught fully on-campus or in hybrid, blended or flipped (i.e., where students study and engage with the online instructional resources and then attend real-life on-campus sessions to work on individual or, better yet, collaborative activities to deepen the students' understanding of the content).

One online solution could consist in tracking, identifying and implementing more opportunities for students at-risk of dropping out—including proactive online mentoring and tutoring---based on real-time data derived from the LMS and predictive analytics. These LMS systems record and track every single student outcome, quiz, exams, project and forum discussion. So, faculty can easily identify students that might be struggling in their classes by simply displaying their electronic gradebook on the LMS. When they discover anomalies, they can generate an electronic message alerting the student of missing assignments or projects. The

investigator has used this technique with great results. And, surprisingly, the students in the class have provided evidence that they appreciate the early intervention (within the allowed ethical, privacy, security framework provided by the systems' tools).

Currently, many institutions with low-retention rates do not offer online tutoring and mentoring services for at-risk students, while they might already be providing mentorship programs for athletes and honor students. That is, not all students have access to or are aware of opportunities to have an online advisor/mentor. Online tutoring and mentoring can lead to a better feeling of belonging for students. In a study performed by Colvin and Ashman (2010), it was found that peer mentoring was a successful way to make students feel a sense of belonging (Colvin & Ashman, 2010). Peer mentoring was determined to be a motivating factor for students to stay and succeed at a university. In addition, tutoring is an excellent way for students to seek out help from other students who have already taken courses. Having a peer tutor helps students understand topics explained at their own level. Both online peer mentoring and tutoring may be delivered cost-free (or minimal cost), as the tutors and mentors might already be compensated with service learning hours, for instance. And more work-study students might be able to participate from anywhere, anytime (even weekends and evenings).

Online Scholarships/Financial Assistance/Micro-Financing via App

Fortunately, MyCAA participants (i.e., military spouses) receive their training at no cost to them if they meet the DoD MyCAA program requirements. However, many students do not have access to that type of financial assistance (FA) program.

So, whenever possible, university foundations, government, NGOs, and private organizations should implement additional scholarships and financial assistance for students that are struggling to meet tuition rates. Many schools offer scholarships to students who excel in academics even when those students are less likely to drop out. But students who are struggling academically pose the larger impact on retention and graduation rates. Providing *micro-financing* tools for tuition payments and textbooks might be developed by partnering with private corporations or non-governmental organizations.

For those students who struggle with academics, the online mentors/tutors previously mentioned could help them submit applications for assistantships. Financial aid is already offered for students who cannot afford college by the university and by the state. Universities should simply make students more aware of the aid that is available and consider partnering with private companies to provide micro-financing, when students are unable to qualify for current aid. More importantly, faculty could choose to utilize more open source content. Rather than requiring expensive textbooks, professors can use online open source textbooks and instructional materials. This would save students hundreds of dollars per semester and lead to overall improved student persistence and well-being.

Online Student Support Services: Integrate Current Outreach Programs via App

Background: TRIO (2018) Student Support Services is a federal outreach program designed to identify and provide services for individuals from disadvantaged backgrounds and offers many services including academic and career advising, tutoring, peer coaching, workshops, summer bridge programs, and computer lab to name a few. When students are accepted at a university as their college of choice they receive an email from TRIO SSS stating that they could apply for the program. In order to be a part of TRIO SSS and use their service one has to either be a first-generation college student, be considered to have low income or have a disability. TRIO student support services include financial literacy, and financial workshops and some students receive scholarship. The required advising meetings are personal and the advisors are all equipped with knowledge of the university and are able to answer any questions. Further, they keep notes of the students on the computers and have access to the students' grades.

Since TRIO SSS is a federally funded program, statistics are gathered often and a report showing the completion rate for student support service participants seeking bachelor's degrees who were full-time, first-time freshmen at four-year institutions went from 42 percent to 51 percent (Ginder, Kelly-Reid, Mann 2015). This increase may not seem significant but TRIO SSS supported 103,691 students at four-year institutions and 101,065 students at two-year institutions and the fact that these students even through adversity are able to graduate is great. With further studies in the program there should be advancements in continuing to increase the percentage of graduates. Could a similar program be implemented online for all at-risk students?

Implementation: With adequate funding, a similar program could be implemented online. But the school would have to find an automated way to identify students that fall into the at-risk category (i.e., danger of potentially dropping out). Fortunately, as mentioned earlier, universities are already using *big data* and *predictive analytics* to analyze large amounts of data from former students' records in order to identify those current students, many from low-income families, who seemed most likely to drop out of school. Although not a simple project, this could be implemented at scale by developing a machine-learning/deep-learning algorithm developed for this purpose. Of course, academic counselors might need to be retrained in order to evaluate their students and implement interventions. Proactive counselor meetings should be required every semester so that the students' wellbeing is evaluated in addition to their curriculum pathway.

Process: Of course, the new system would require personnel changes across the university. Since each department at the university may be affected by the others throughout the process, clear communication between stakeholders is essential. As shown in Figure 2, whoever makes executive decisions, usually, the President, Provost or Vice-President for Enrollment Management would have to initiate a restructuring or process re-engineering or develop the new system. Then the appropriate software would need to be developed or procured followed by extensive training. The software would be a large initial outlay of funds. But the cost may be recouped by the resulting increase in graduation rates since many schools are receiving performance-based funding.

As discussed earlier, some systems and online apps (solutions) have been proposed and implemented at various institutions very efficiently and effectively. But, can we develop an app that will be able to engage and link a community of learners—integrating students' life, work and study?

Development of a Mobile Learning Prototype

Since 2015, the project director and several undergraduate information-systems and software engineering students have been involved in the development of alternative solutions to stimulate student engagement with peers, faculty, mentors, advisors as well as streamlining the student learning process (Rodriguez 2015). In 2017-2018 initiative, the basic design app requirements include: (1) focus on students' engagement via mobile technology; (2) design simplified User-Interface (UI) and User Experience (UX); (3) provide connective functionality; (4) automated reminders and notifications; (5) quick load times; and (6) user-friendly team-collaboration.

System Requirements

When designing such a mobile app, it will need to run on all iOS, Android as well as provide web and Windows support. This app should be available to anyone who is a student at the university. Students upon downloading the app, will be prompted to give consent to the database to access personal information such as assignment due dates, upcoming tasks, and graded assignments. Due to privacy/ethical/security reasons, students will also have to give their consent to have their contact information uploaded into a database on the app's server to allow communication access between students. This would allow only privately and securely encrypted transactions among

students and their faculty. Further, there should be no “surprise” (unqualified) data and information extracted aside from what the students permit.

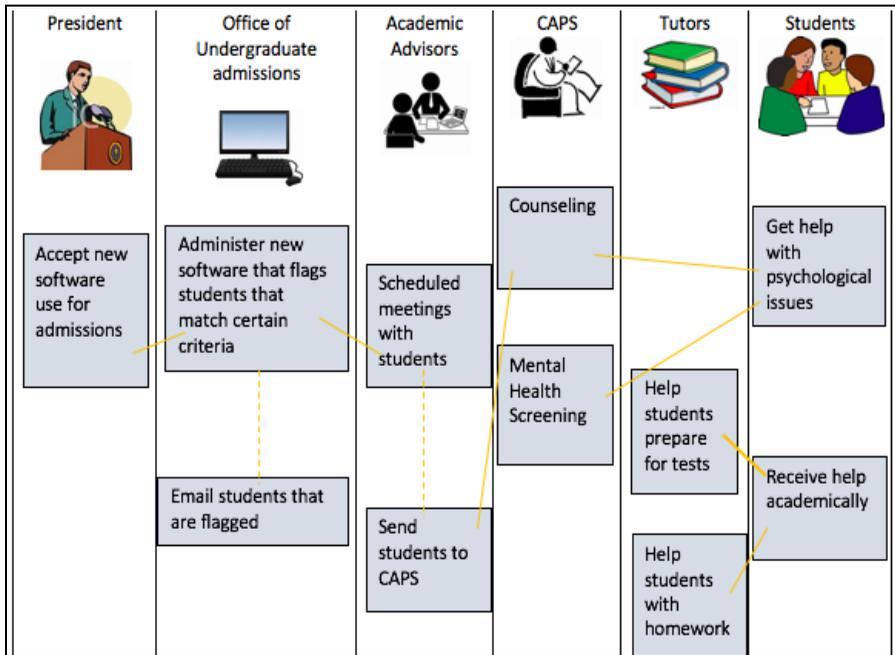


Figure 2. AI System Development Process

Table 3: System Requirements

Data	Functionality	Dev	UI/UX
Displays data pulled from preexisting App, LMS	Easily Accessible, downloadable, quick sign up time	Quick Load Times/ Page Speed	Sleek and simple design
Needs to retrieve basic information from all students.	Easily to manage notifications or messages	Need to establish an API call with LMS to pull in needed data	Design with the concept of sustainability and reliability

Source: White 2018

Data Requirements

To develop such an app, developers would need to utilize and integrate with the LMS. LMS stores all student data such as assignments, due dates, upcoming assignments, and hosts an email communication system as well as contains contact information of students and instructors.

Functional Requirements

The app should be easily navigable and downloadable. This app should have a quick process download time, as well as a quick response time when storing new student information. When the student has notifications or messages, the app should provide user different variations of how

to be notified: alarm, text message, email notification, home screen notification or simple vibration tone.

Development Requirements

In order to make the data needed easily accessible, the developers would need to set up an Application Program Interface (API) call to pull the data from the LMS. This call would update on a daily basis at midnight EST. This function would continuously update the app with new assignments, instructor communications and information (i.e., should it change, and new introductions to discussions.) This function would put less stress on the system in times of extreme updates such as the beginning of add/drop week, course registration dates etc. The development team would need to ensure that the page loading time, page speed time, and integration time is as low as possible to indicate a fast processing system.

UI/UX Requirements

Developers would need to conduct front end-user testing, as well as back-end user-testing. In addition, they would also need to create wireframes and prototypes of the internal and external system and test different versions using a group of randomly selected students. These designs should focus on the concepts of simplicity, reliability, and sustainability. Developers would need to come up with different color themes so students have the individuality to truly make the system their “own” app. In addition, students should be able to customize layout functions with drag and drop methods and delete sections should they not find them relevant (July Rapid 2016; *Savvy Apps* (2018).

Prototype: Software App for Student Time Management

For rapid development, the system could start with a time-management function and progressively increase functionality to address other issues. For instance, later on, developers could utilize advanced technologies, such as artificial intelligence (AI) and adaptive learning software. The application could use AI that learns how long it takes students to complete certain assignments and tasks and use that information to better choose how to schedule the student’s day. The LMS system can be synced with the application. So, assignments and other important calendar items can be imported into the calendar of the application. Cross-communication takes the workload off of the student and places it entirely on the system.

The application for student time-management should have a sleek, simple design. It should be intuitive for students to understand exactly how it works. There should be functions for the students to see tasks in a calendar form, tasks in a list form, completed tasks, and a connection to the LMS. In addition, students should be able to sort by day, week, and month for different views of tasks to be completed. A recommended prototype design for the application is shown in Figure 2. But there are some commercially available calendars that could be investigated (Kazmucha, A. 2014).

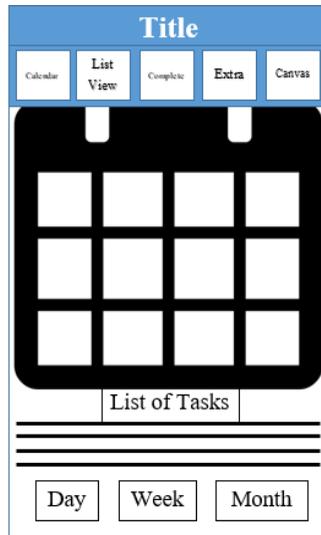


Figure 2: Prototype Design of Application for Student Time Management
 Source: Lystad 2018

With an application, such as a time management, one cannot only help students stay organized, but it can also help to teach them time-management skills. In addition to features for time management, the application may also connect students with mentors, tutors, and advisors, i.e., in a community of online learners. The app can link students right to a page that allows them to schedule an appointment with their advisor or tutor.

For students with financial needs, the application may link straight to the financial aid portal. The financial aid portal can contain the information explained previously in the financial aid section or offer micro-financing options, as discussed earlier. It is essential to make it easy for students to access financial aid if the university wants students to take advantage of it.

Of course, the answer to the persistence problem is not just one single solution. In order to meet its goals in solving the persistence problem, the university should consider which of the other non-technical solutions are feasible and economically viable to implement. Table 4 shows the pros and cons of each sample solution.

Table 4: App Solution: Pros/Cons

Possible Solutions	<i>Pros</i>	<i>Cons</i>
<i>Online, Mobile Mentoring/Tutoring</i>	Free: Build sense of community or community of online learners that help each other.	Cost: Need to have access to a smart phone, cellular mobile device or computer connected to the Internet, if unable to use university labs.
<i>Financial Aid</i>	Helps students pay Rewards academic success	Cost to the institution Does not help all at-risk students
<i>Application</i>	Helps students manage time Builds career skills Used by all students	Cost to the university, although it might be developed as a collaborative class project.

Source: Lystad 2018

Firstly, adding more financial aid for students might be an issue for universities when its already experiencing funding challenges. Even further, financial aid may not necessarily encourage students to try to succeed and graduate in four years. A better approach for financial aid is to encourage and reward students who are academically successful by staying on track and on their selected curriculum pathway. Students that earn high grades should be eligible for scholarships and grants.

Aside from tutoring, the time-management application could be a lifesaver for students that have trouble managing themselves. There may be additional costs for institutions to implement a new app, but these costs can be mitigated by assigning work-study Computer Science and Computer Information Systems (CIS) students a class project. A developmental effort, such as this app, falls within the scope of CS/CIS students and could be effectively and efficiently accomplished---not counting the educational experience if coordinated with several software development companies. After implementation, the costs to the university would be minimal and the benefits are anticipated to be exponential. Students will have fewer obstacles when it comes to completing schoolwork as well as budgeting time for extracurricular activities to benefit retention. Figure 3 shows the system development process for the app.

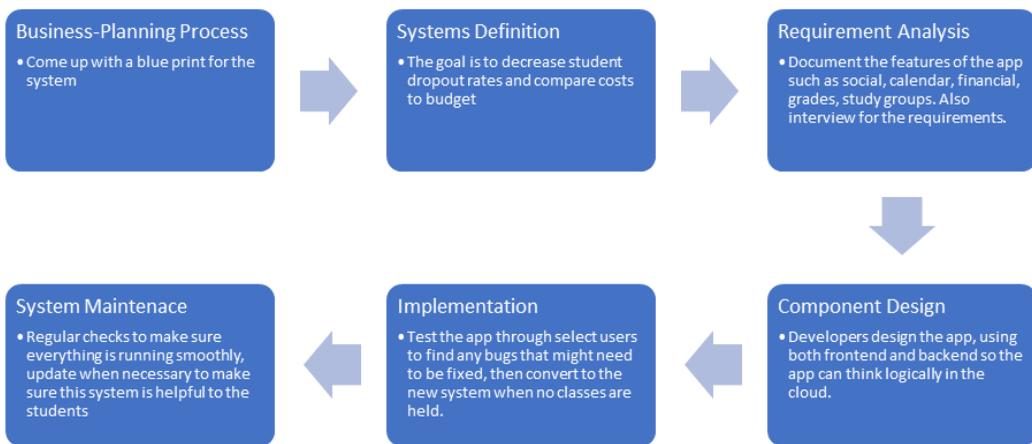


Figure 3. Software Development Life Cycle for the App. Lynch 2018

Ethical, Privacy and Security Issues with the App

Although the app solution seems adequate, some critical issues may arise from the system. The first major one is dealing with privacy, security and ethics. “Computer technologies present ethical problems that cannot, as an objective matter, be adequately resolved by recourse to existing ethical theories” (Himma 2007). With the proposed system recommendations, the students’ privacy might be an issue of concern, particularly, if the advisor or faculty would be able to see the last time they logged in and s/he tries to micromanage the students’ life, work and study. There would have to be a balance between trying to help students and trying to micromanage students if they missed an assignment, which might cause concern among the more independently minded students. It could lead to cases against the school, if students feel like they have no privacy when it comes to their school work. Therefore, the institution should create

panel discussions with both students and professors to see how they feel about the system and try to work to ease potential tensions---so student do not feel their privacy invaded. Fortunately, apps and systems may be designed to be opt-in or opt out. And, they can also be *designed to be proactive (perhaps, intrusive) or to simply lay out passively and let the user takes control of its functionality.*

An Integrated Student-Success App

Data is everywhere. Universities collect a great amount of data about students that may be used (within the privacy/security/ethical constraints) to help address students’ persistence in college. And, an integrated student-success app can be designed to meet the desired goals.

The figures 4 and 5 below provide an example of how an application could “proactively” or “passively” help guide students to seek help if they come across a difficult situation and they need online assistance.



Figure 4: Student Success Interface Interface. Source: Souza 2018

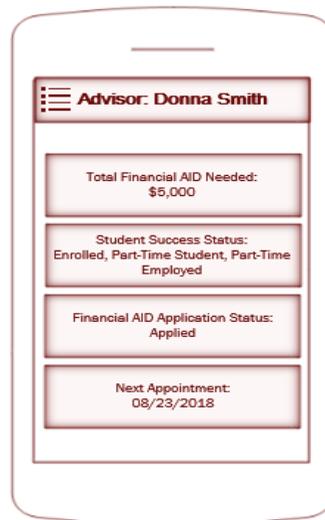


Figure 5: Student Success – Advisor Source: Souza 2018

This mobile student success (Figures 4, 5, 6, 7 and 8) may allow students to set appointments and communicate with a support team that may be composed of advisors, psychologists, and faculty members—in an integrated fashion. In addition, students would be able to access information (tailored specifically for them) to support their curriculum pathway and help them set goals to achieve the desired outcome (i.e., hopefully, timely graduation). The support team would be armed with a robust database that would present them all the necessary information to guide students to graduate on time and keep them motivated.

The figure 6 and 7 below illustrate some cross-functional capabilities to help the support team. Information such as the student’s GPA, the financial aid required until graduation, and the course sequence needed to graduate are all listed together under one platform. This compiled information can help students and the support team take the necessary steps to successfully address any issue they might need to solve and plan an effective success path to graduation.



Figure 6: Student Success - Profile
Source: Souza 2018

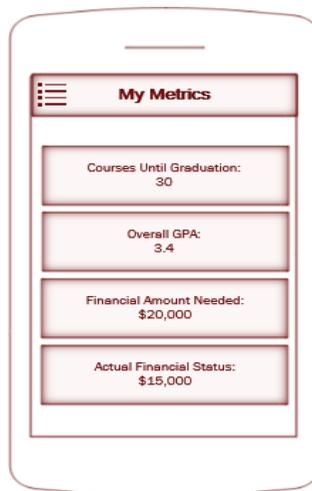


Figure 7: Student Success - Metrics
Source: Souza 2018

The support team would be able to customize the information that they want to analyze. In other words, the support team would be able to write queries to import information from the database to help students understand better the situation and the background information of each student. It's possible that the advisors' roles would be to proactively check if the students are registering and taking the courses required to graduate on time. However, they could they also inquire about grades performance, or if they needed financial aid, or if students are happy with their selected major.

In addition, advisors or mentors could possibly ask about the student's well-being---trying to indirectly assess stress-levels or if they are feeling motivated to continue taking classes. Despite the ethical/privacy/security issues that may surely arise, these types of questions are important and must be asked. Reason: Maybe some students might feel ashamed to ask for help. In some cultures, complaining about a problem to others might be viewed as "negative people" or complainers. If advisors, like social workers, would be allowed to ask why students' grades were so low, or if they had noticed disappointment with the class and stress levels, maybe they could better guide students to seek help and maybe they wouldn't have dropped college.

Although there are lots of help available to college students, the immediate connection might not be readily available at critical times. So, a mobile app may be a more active, interactive and proactive approach to identifying needs and wants. Moreover, if a student needs to take a break from college, they usually have to re-apply to be placed in the college system again. Are advisors checking why a student didn't take any classes for two semesters, and more importantly, asking why students dropped out college? So, some feedback mechanism needs to be implemented.

The above illustrates the importance of a system that would offer cross-functional capabilities---including the participation of advisors, mentors and faculty working together to ensure that each student that needs help is getting the attention required in a timely fashion. Theoretically, if implemented well, every function would be just by the click of a button students can reach out for assistance.

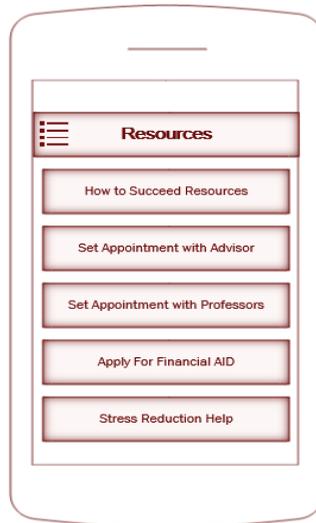


Figure 8: Student Success – Resources Source: Souza 2018

Figure 8 above, illustrates some of the resources that could be available to students via this application. These resources page could include capabilities; such as: the functionality to apply to financial aid, or to access micro-financing resource; the functionality to set appointments with support team members; and the capability to seek for more information to improve their overall college performance. In addition, students that work and study could ask for help by reaching out to members of the support team through the application that could provide support via chat, email, or live sessions.

The above illustrate just a few ideas and sample mockups to get the process started, once the institutional permission is granted as well as the funding for the developmental efforts.

Conclusion

While this research project was able to discover and implement a high-level of online student support in its MyCAA project, in collaboration with the partners (MedCerts), sponsors (DoD) and collaborators, many institutions and private training providers, have been unable to provide the same level of participant support. And, therefore, they experience low completion, low retention and low persistence rates in their programs and offerings. So, persistence remains a critical issue in both academic and pre-professional certification training sponsored programs, like DoD MyCAA.

To sum up the project's recommendations, mobile learning is transforming both educational and instructional delivery at all levels. Before deciding to implement mobile learning technologies and innovative pedagogies in their online courses and certification-training programs, advisors, faculty and institutions would benefit from analyzing mobile-learning's strengths, weaknesses, opportunities and threats (SWOT), particularly its effects on retention and persistence. Mobile learning is relatively new as a ubiquitous learning approach, so the advantages and disadvantages or benefits and perils should be analyzed before deciding to utilize this form of learning delivery method. Many faculty and students are aware of the convenience and flexibility of using mobile electronic devices and its popularity is growing due to several factors but not the pitfalls and challenges. Mobile learning is useful for participants/students with particular needs. So, it widens opportunities for accessibility of learning anywhere, anytime. Demanding mobile, online courses create both an opportunity and a challenge for e-learners or m-learners. It provides tremendous scheduling flexibility for study-work students. But, if the

institution doesn't have a robust student-advisor-faculty support structure for fully-online students, these students may be inclined to drop the course without seeking campus or off-campus support. Succinctly, online students are taking longer to complete their degrees and certification-training programs and, unfortunately, many never complete, graduate or pass their national certifications.

This research examined the problems students are facing. Two characteristics were analyzed, namely, student characteristics, and institutional characteristics. Alternative solutions were presented to increase the participants/students' completion and retention rates as well as help students find a balance between work and study. One of the solutions consists in developing a robust and cross-functional mobile-learning application prototype to address the key issues and dimensions of well-being impacting students' persistence in college. The mobile-friendly app prototypes have user-friendly pull-down menus to access an interactive assignment calendar--including functionality to set appointments and communicate with advisors, faculty, mentors and support staff. In addition, the app prototypes incorporated ways to balance work and social life; display grades and warnings; access micro-financing resources for paying for textbooks and tuition, when needed; keep track of pending and completed assignments; ways find study groups and mentors, among other functions. Privacy, security and ethical dilemmas as well as challenges in funding this free app were considered. Given the above challenges and constraints, could software systems and applications help reduce or minimize the dropout rate problem and maximize retention rates? The answer might be to create an integrated support system solution at the "palm of the students' hands"—including a mobile app that would provide aid, just-in-time information, based on the issue at hand. It would be available at no cost to students and readily downloadable on their smart phones or the web. This app would be offered independently or it might be integrated within the university LMS, with some additional persistence features. Ideally, the app would sync with LMS data, so the students' courses and current information (i.e. grades, due dates, etc.) would be automatically uploaded and updated--including when their assignments are due. Actually, this feature is only one of the few that would require drawing data from the LMS as the rest of the features are more extensive. The first feature that the app would offer is a Calendar/Scheduler. This function would indicate when assignments are due. A student may also edit it and add their weekly personal work-study activities to the calendar, so their assignments, class schedules, meetings, and other social activities can be found in one handy place. The calendar would have a setting where student can look at tasks for that day or it can break it down more as it shows hour by hour activities. With the calendar comes notifications. If the students opts-in, notifications would be sent to the him/her at least one day prior to the due date. The user can also opt for notifications at the start of the day of everything they have that day, so they know when everything is due. [Note: Many LMS have a function that allows instructors to send reminders (i.e., when an assignment is due) but it's not automated and not all faculty use it. The project director has used this function very effectively to reduce non-submittals and maximize student timely submittals as well as improve persistence.]

When the user opens the app, on the top bar of the screen, it would show the assignments due that day. The app could have other functions, such as, a social tab. The social tab would allow clubs to post their meetings when events are happening on campus, or even if someone is looking to watch say a sports game with people rooting for the same team. This feature is meant to get the students involved on campus and to meet friends who have shared interests. This feature can keep a student active and happily engaged which might prevent them from dropping out. Another feature could be a study group section. This is an area where someone can post about looking to "meetup" with people who are taking the same class, so they can help each other understand the materials. Students need peer support and if they can find compatible people to study with, they might be able to reinforce what was learned in class and do better in the course. Another feature on the side could be financial aid. In this tab, advisors or those maintaining the app could post about scholarships and links to apply for scholarships, so

students can go to the tab instead of researching for the scholarships. It would save the students time so that they can focus on their studies. The next part of the system is to connect the professor, so both are on the same page. On the student side, if the student missed an assignment, a notification would pop up on their screen that they would have to answer of why they missed the assignment. The notification would ask if everything is okay? They can click yes or no. If they click yes, they would have to type why they missed the assignment, so the professor would be able to know. If they click “no,” another screen will pop up with answers as to why—such as, struggling with the concept, having financial problems, mental health problems, work, other, or even rather not say—which the student will answer and that will be sent to the professor or advisor. The professor would be able to know what is going on with the student, so they can reach out to them and try to help them before they drop out. Now on the professor side, they will be able to see when the last time the student logged in. This way they can know that if the student has not logged in a while, the professor can try to reach out to them in class or by email. The professor will also get automated notifications if a student missed an assignment, so they can reach out to the student as to why if they have not received the message yet.

There is certainly no simple solution when it comes to fixing the student persistence and retention problem. It is neither the fault of the students, nor the faculty, nor administrators or advisors, but rather a culmination of years of unintended academic chaos, as universities and colleges grow and grow without adequate resources. If students were to put a higher value on engaging in class, and if universities became more willing to accommodate students’ busy schedules by offering more online, mobile classes and by engaging them as a mobile, ubiquitous learning community, student retention and student involvement would probably increase, as illustrated by the MyCAA pilot project. Furthermore, offering more tutoring and better supplementary instruction would ensure that students pass courses the first time, saving them time and money. Offering more scholarships and designing engaging apps and systems to help students stay on track with coursework may improve retention and graduation rates as well. Of course, data will certainly tell if these approaches will actually improve outcomes, as universities implement and measure tactics, such as, acceleration (Herrera, Morales, Holmes, & Dawn 2012), adaptive learning (Walkington 2013), pre-freshman prep (Wischusen, S. M., Wischusen, E. W., & Pomarico, S. M. 2011), mentoring (Lenz, A. S. 2014), predictive analytics, smart advising, wireless fingerprinting (Talaviya, Ramtekte, and Shete (2013), automated degree-planning, mass personalization, structured guided curriculum pathways, in-class tutors, among many other initiatives (McMurtrie, B. 2018). But, even without all these approaches and technologies, the faculty has a pivotal role to play (Stevenson, Buchanan, and Sharpe 2007). And as more faculty conduct timely low-tech interventions (i.e., by simply asking “What happened?” “Why haven’t you completed the assignments?”) and provide alternative, engaging, relevant assignments and projects, universities may expect improvements in students’ persistence.

Finally, in order to implement the above AI strategic plan and the stated recommendations, we would need to obtain funding from DoD as well as university approval.

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