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Designing a Free Academic Early Alert System

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Description of the Problem

Key element 17.2 of the 2016 Accreditation Council for Pharmacy Education's standards for the Doctor of Pharmacy Degree requires that colleges monitor student performance and have a mechanism to detect academic issues early in the curriculum.[1] Several methods have been utilized by colleges and schools of pharmacy to identify students with early threats to normal progression. Daugherty et al. describes how reviewing performance twice during a quarter/semester is helpful in identifying students at high risk of failing.[2] Other strategies to detect poor performance include grade point average (GPA) alerts, where interventions occur if a student's GPA drops below a certain cut-off point, and performance benchmarks, where interventions occur after examinations throughout the semester.[3] Over 75% of colleges and schools of pharmacy use GPA as a measure for progression and probation issues, with a 2.0 GPA as the most common benchmark for success.[4]

The first step in making an early intervention is being able to identify students in a timely manner. Successful intervention may promote normal progression, as delaying graduation could represent an additional financial burden to students. In 2014, graduating pharmacy students reported that they borrowed, on average, $149,320 to help finance their education.[5] This debt coupled with the opportunity cost of loss of future salary reiterates the need to ensure timely progression through the curriculum.

Statement of Innovation

The focus of this manuscript is to demonstrate a sustainable early alert system to identify students at risk for progression delays. It is not to discuss intervention tactics, as this would be specific to the student and curricular situation. A sustainable system should be easily adopted into workflow (i.e. require minimal additional work), maintain confidentiality as needed, and provide useful information that can be acted upon (e.g. close the loop). Additionally, a sustainable early alert system should have minimal costs

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associated with it. This manuscript will discuss the technical and human resource aspects of developing a free, cloud-based early alert system for a college of pharmacy. It will also describe experiences with the system.

Innovation

Members of the Office of Academic Affairs (OAA) and the two department chairs (Pharmacy Practice and Pharmaceutical Sciences) first discussed the need for a system during a routinely scheduled meeting. Previously, spreadsheets were copy/pasted manually from a master spreadsheet and emailed to individual faculty advisors. This process was time consuming and the physical copying led to a higher risk of error. In finding a new system, low cost and familiarity for faculty use were important factors. After evaluating a few platforms, the OAA staff chose to build the early alert system within the Google Drive tool, Sheets (Alphabet, Inc. Mountain View, CA), which is a free online cloud based spreadsheet program. This program allowed several key benefits: 1) The platform would be easy to use, free for users, and would be scalable to all of the faculty members; 2) Sheets could be securely shared with individual faculty members, who serve as advisors to specific students; and 3) Application programming interface (API) syntax could be used to pull data. The API code contains multiple sections that will be explained below.

East Tennessee State University uses Microsoft Office 365 (Microsoft, Inc. Redmond, WA) on campus. In order to use this Google-based system, only the administrator for the Master Sheet needed to have Google credentials (which are free through Gmail). In our situation, faculty members with a non-Google email account were sent a unique hyperlink to the data and instructed to not share the link. Having a Google account (e.g. Google campus) adds a level of security because faculty would need to log-in with their Google credentials to view the data. Colleges of pharmacy should consider their policies related to student privacy laws in considering if using Google credentials to access information is adequate.

Step 1: A Master Sheet
The first step was to create a Master (spread) Sheet that would contain data from students with non-passing exam

scores. See Figure 1 for an example Master Sheet that includes in part, student name, faculty advisor name, course, non-passing grades and certain pre-pharmacy qualifications. Data for the Master Sheet were entered manually by OAA staff soon after faculty members posted exam or other grades in the learning management system. The OAA staff emailed advisors after each round of exams prompting them to view the sheet for their advisees.

The Master Sheet serves as the central database for pulling data into individual sheets for faculty advisors. Sheets are then created by OAA for each of the faculty advisors. Only specific information for an advisor needs to be pulled from the Master Sheet. This process is done through a unique API query code. The first portion of the API code is the unique component of the web address for the Master Sheet. This can be found by clicking the Share button in Google Sheets and copying the unique portion of the web link that is in between the forward-slashes (e.g./18t0haRCNQVhyycdAGF7PcTGF9IJXxsGKyWuO9NJkKwc/). That portion is then copied for use in the faculty advisor sheet (see Figure 2). The sheet is securely shared with faculty advisors and is accessible through their Google log-in credentials.

Step 2: Selecting Specific Information from Master Sheet
Only specific information from the Master Sheet is relevant to an individual faculty advisor. In order to limit the correct information to the advisor, the API code needs to be expanded to show exactly where to pull the data from the Master Sheet. The first step is to specify the tab on the Master Sheet where the data are being pulled. To specify a tab, enter the tab label (See X in Figure 2) followed by the range of cells that contain the pertinent information. In order to cover all potential information in the Master Sheet, a range from row 2 to 100000 was used in this project. (In reality, only the number of rows in which information is contained is needed.)

After the unique code to the Master Sheet and the particular tab within the Master Sheet are identified, the next step is to pull the faculty advisor-specific information (See Y in Figure 2). In order to do this, one of the columns in the Master Sheet must identify the faculty advisor. Each identifier must be unique. In the Figure 1 example, column 4 (Col4) was used to identify the advisor's last name. If the names were the same, a beginning initial(s) was used. This becomes the last section of the code used to share the data with advisors (See Z in Figure 2). This section also represents the only unique portion for all of the faculty advisors. Syntax is important as a misspelled name would fail to link a particular row of information.

Once the code is established using the web address unique share code (W), tab label (X), column (Y), and faculty identifier (Z), the entire API can be copied and pasted into a new Sheet in the first cell (A1). This will create the faculty advisor specific sheet that pulls data from the Master Sheet.

Step 3: Making the Sheet Bi-Directional through Comments
The early alert sheet as described above takes information populated by OAA and sends it to faculty advisors. Advisor interventions based on the early alert were captured using Google Forms. With this platform, faculty advisors have the capability to add comments to the early alert sheet. The comment form uses the same method to distribute data as the early alert sheet. When a Google Form is generated, an accompanying Google Sheet is created to collect the comments, thus acting as a Master Commenting Form. Figure 3 identifies the basic format of the comment form. While in the Master Sheet, select Insert, Forms to establish a blank form. This form will automatically be added and linked to the Master Sheet as an additional tab on the bottom of the screen. In an effort to ensure consistent syntax, faculty advisor identifiers were added to the form as a dropdown box that was prepopulated by OAA.

Critical Analysis
Any student who earns a non-passing grade on any semester exam is added to the early alert Master Sheet along with all previous and subsequent exam grades for that semester. On average, the system can be updated in 30 minutes per exam, although the time varies based on the number of students earning non-passing scores. Data are archived at the end of each semester and the contents of the Master Sheet are cleared for the beginning of the next semester.

The spring 2015 and fall 2015 semesters were used to capture utilization rates and the effectiveness of the early alert system. Looking at two semesters over different academic years allowed for inclusion of different faculty advisors. Only students in the didactic curriculum (i.e. P1-P3s) were included in the analysis. Students listed on the Master Sheet were considered lower risk if they maintained a passing course average. Higher risk students had a course average below the passing level and were indicated by their course average listed in red font in the sheet. The data collection process was approved by the Institutional Review Board at East Tennessee State University.

In the spring 2015 semester, 239 P1-P3 students were actively enrolled in the College of Pharmacy. There were 122 (51.0%) students listed on the early alert sheet. On average, each student was listed for 2.04 courses, totaling 249 student-courses. The spring 2015 semester had 23 faculty advisors assigned to students, with 8 actively contributing to the comment form at a rate of 8.88 entries per active advisor.

One advisor had zero students listed on the sheet. Eight advisors had students listed who were considered low risk (e.g. student maintained overall passing course average). Five additional advisors did not contribute to the comment form despite students being listed on the sheet with a higher risk of failing the course.

In the fall 2015 semester, 18 advisors were serving 244 P1-P3s. Of those students, 129 (52.9%) were identified on the early alert sheet. Each student was listed, on average, for 1.95 courses, totaling 249 student-courses. There were 9 advisors actively commenting at a rate of 6.44 per active advisor. One advisor had zero students listed on the sheet. One additional advisor had low risk students listed, and 7 advisors had higher risk students listed, but did not contribute to the comment form.

Key Findings
This paper describes a method to create a central spreadsheet of exam performance that can be coded to release certain information to specific advisors. This system was used for all didactic students throughout each of their semesters. The early alert system provided an opportunity for timely feedback on student performance on a relatively continuous basis (i.e. after each exam). Some colleges utilize a GPA method of identifying students at risk of failing to progress.[3] This requires completion of a semester, in order to identify students at risk. Performance on a first exam may have a strong correlation with risk of failure.[2] Our early alert spreadsheet has the capacity to identify students at risk after the first exam. This could be of benefit to students early in the program (P1) from a career-investment standpoint, as well as later (P3) from a semester success standpoint.

Interventions that result from an early alert system should be captured to ensure that the loop is closed. This involves faculty advisors taking an active role in the system. Faculty involvement, while significant, could have been improved. Perhaps the system being new and voluntary contributed to lower faculty involvement. Also, a lack of guidance from administration may have contributed to complacency.

Next Steps
Encouragement from department chairs may improve utilization of the system. The development of guidelines or training may provide direction to faculty advisors on how to engage students on the list. In the future, the college anticipates adding a professionalism tracking component to this academic early alert system. Additional measures, such as attrition rates and NAPLEX scores, could also be compared with data in this system.

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Figure 1: Example Master Sheet

	Col1	Col2	Col3	Col4	Col5	Col6	Col7	Col8	Col9	Col10	Col11	Col12	Col13	Col14	Col15	Col16	Col17	Col18	Col19	Col20
	Last	First	Yr	Advisor	Course	Exam #1	Exam #2	Exam #3	Exam #4	Exam #5	Exam Avg	Final Grade	Pre-Pharm GPA	Math/ Science GPA	Comp PCAT	VA	BIO	RC	QA	CH
	ABC	Student	P1	Fac-A	PMSC 3116 Human Physiology	84.9%	73.9%	78.0%	59.5%	80.0%	75.3%		3.29	3.10	68	63	40	79	77	65
	DEF	Student	P3	Fac-B	PMIN 5110 IS: Neuro & Psych	52.9%	78.3%	73.6%	71.2%		69.0%	73.3%	3.10	3.09	47	43	20	62	61	56
	DEF	Student	P3	Fac-B	PMIN 5120 IS: Endo, Eye & Derm	65.1%	64.4%	65.2%	84.3%		69.8%	75.6%	3.10	3.09	47	43	20	62	61	56
	GHI	Student	P1	Fac-C	PMSC 3116 Human Physiology	69.8%	69.3%	70.6%	73.1%	88.3%	74.2%		3.02	3.19	46	28	35	56	39	48

Figure 2: The API Code Syntax

=query (importRange("W", "X","where Col "Y" contains 'Z'")

W= unique portion of shared link from Master Sheet (example: 18t0haRCNQVhyycdAGF7PcTGF9IJXxsGKyWuO9NJkKwc)
X= the tab or sheet within the Master Sheet and the range of cells to be searched (example: Sheet1!A2:AB100000)
Y= Column in Sheet that contains name of Faculty Advisor (example: Col4)
  • This ensures the privacy of link
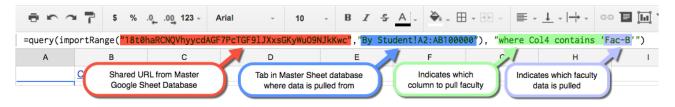Z= Faculty advisor name that data will be pulled from Master Sheet (example: Fac-B)

Figure 3. Intervention Form for Faculty Advisors