2019 Technology Fee Full Proposal

Title: Facilitating Learning through Smart Pens

Proposers: Megan M. Daly, Library West; Gerry Altamirano, Disability Resource Center; Jessica Krauth, Disability Resource Center; Ann Lindell, Architecture and Fine Arts Library; Michelle Nolan, Marston Science Library; Joe Wu, Health Science Center Library.

Sponsoring Organizations: George A. Smathers Libraries and the Disability Resource Center

Purpose and Specific Objectives: The George A. Smathers Libraries and Disability Resource Center (DRC) request $71,940 to purchase 300 Livescribe pens, protective cases, paper, and ink to enhance note-taking capabilities for students, faculty, and staff. Livescribe pens use built-in camera and recording capabilities to help students digitize, preserve, and readily access their notes (see demonstration). Students thus create more accurate and organized notes, potentially leading to better comprehension, retention of information, and higher performance in classes.[1] The proposers seek to continue their mission of providing learning tools for all by offering Livescribe pens to aid in writing and preserving lecture and reading notes in classrooms, at home, and on the go.

This project will expand access to Livescribe pens for DRC-registered students and open up access to all others on campus. To meet the needs of students across disciplines, Livescribe pens can be checked out from circulation desks at five campus libraries. Library faculty on the project team will assist the PI with the program at each of the libraries. The team will allocate 200 pens to be available to DRC-registered students at Library West for a full semester check-out by showing an accommodation letter with the approval for "Livescribe Pen use in courses." The team will allocate 100 pens to be available to the general student body for seven day check-out, with 50 of these pens available at Library West, 34 at Marston Science Library, three at the Architecture and Fine Arts Library, three at the Education Library, and ten at the Health Science Center Library.

The Libraries are accustomed to offering instruction to students and will provide staff time and workshops to teach students how to use the pens. On a recurring basis the PI will hold an instruction workshop at Library West. She and the other librarians on the team will also be available by appointment to help students learn the technology. The pens, however, are very easy to use and most students will likely be able to learn from watching online videos like this one on getting started or this quick tutorial. The librarians will also provide a library guide (LibGuide) with all information about the smart pen program, including a how-to section.

The project team will evaluate the program by recording the number of pen checkouts during the initial year. We will also distribute a Qualtrics survey after pen check-in to determine satisfaction with pens, obtain suggestions regarding policies, and gain insight on how users were able to use the pens to enhance learning.

Impact/Benefit: A landmark study suggests that writing notes by hand helps students retain information better than typing notes.[2] However, many students prefer digital notes for easier organization and accessibility in order to work digitally at anytime from anywhere. Livescribe pens can fill a unique niche in education by fostering the development of strong note taking skills while allowing students to save their notes in digital format and audio, allowing for the capture of important verbal information during class.

All students can benefit from these pens. Students can use pens in class instead of laptops, and fewer laptops in the classroom may mean fewer distractions and more focus on class material. For those who prefer typed notes, the Livescribe software can automatically transcribe handwriting to typed text. This can also circumvent the difficulty of deciphering sloppy handwriting later. The pens can be used in labs, chemistry, art, math, music, and language classes for digitizing formulas, diagrams, sketches, or languages that are not easily rendered in typed form. Students can use these pens in science courses like Genetics (PCB3063), Biology (BSC2010 and 2011), and Organic Chemistry (CHM2211 and 2212). They can also be useful for classes like Ancient Greek

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[1] Each pen will come with an advisory message that students should seek permission from the speaker(s) before recording with these pens. Students will be instructed to delete all recordings before returning the pens, but library staff will ensure that all recordings are deleted from the pens upon their return to the libraries.

[2] Mueller, P. A., & Oppenheimer, D. M. (2014). The Pen is Mightier than the Keyboard: Advantages of Longhand over Laptop Note Taking. *Psychological Science* 25, 1159–1168.

(GRE1120, 1121, 1130, and 1131), Hieroglyphics (CLA3161), and Chinese Calligraphy (CHI3403), or for any language with characters that are difficult or impossible to type. One case study has shown how Livescribe pens have helped students improve their study of music, while this video shows how pens can be useful in the study of dance. They can benefit students in all fields, from the sciences to the arts and humanities. When using the pens in meetings, conferences, workshops, and trainings, the students, faculty, and staff can work more collaboratively by recording audio and written notes with ease and sending them out to others without spending time typing notes out. Digitized notes eliminate heavy bags filled with binders and notebooks, preventing back and shoulder strain. Finally, these pens can help students learn skills for using technology for everyday tasks like writing.

Instructors can also use these pens to enhance students' learning experiences by converting a record of their writing and verbal instructions into videos or pencasts.[3] The pencasts can then be disseminated for students to view at their leisure. Pencasts have been used successfully by instructors to demonstrate pharmaceutical calculations[4] but can easily be extended to other disciplines. Livescribe pens provide instructors with a portable tool to create and combine written and voice instructions without needing to rely on bulky and immobile technology such as Smartboard or Camtasia.

These pens will have a strong positive impact on the learning experience of DRC students and others with unique learning differences. The DRC serves more than 3,500 UF students, over half of whom are eligible for note taking accommodation. Some of these students have a diagnosis which makes note taking or attention difficult including ADHD, Anxiety, learning disabilities, and more. These students report experiencing barriers related to taking in and retaining information taught in the fast-paced classroom environment. Many of these students currently rely on a student note taker in order to meet their note taking needs, but that is often problematic as it can be difficult to rely on another student to take accurate and understandable notes. Livescribe pens may help DRC students improve their own note-taking abilities, making it possible for them to rely less on student note takers and become more independent as learners. The pens give students the confidence of knowing that their lecture is audio recorded and that they can easily navigate and revisit the recording and their handwritten notes (see this video about how a Livescribe pen helped a student return to school while overcoming an illness).

Approximately 300 students request a hired note taker each semester with many others using alternative note assistance including lecture recording and note taking apps. DRC students have been using Livescribe pens for assistance with note taking for approximately two years. The DRC currently only has four pens to offer, and these have been in constant demand. Most students who borrow Livescribe pens from the DRC keep the pen for one to two semesters, usually only returning them because they are not taking summer courses or have graduated. The same students often request pens again the following year. The supply of Livescribe pens at the DRC comes nowhere close to meeting the demand by students needing assistance with note taking. Therefore, the team is modestly requesting 300 smart pens to accommodate both DRC and non-DRC students at UF, as well as staff and faculty. This number represents less than 12% of the DRC students eligible for note taking accommodation. This will provide a better note taking option for DRC students and allow them to become more independent note takers as well as learners through practice.

Taking comprehensive notes is difficult for all students, particularly for learners who struggle with writing, spelling, or grammar. Some students experience extreme stress when pressured to capture course content effectively and efficiently, frantically typing or writing the content communicated in class while limiting their attention to what they are learning or what the instructor is saying. This practice often proves problematic for grasping concepts and retaining information. A smart pen program at the University of California Berkeley was found to be a critical tool for students with overlooked needs, such as anxiety, because audio recording capabilities allowed students to focus on taking accurate notes without worrying about missing important verbal information provided by the teacher. Whether they have a clinically recognized disability, difficulty, or challenge, or not, the Livescribe pens will allow students to:

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[3] Fisher, L.F. & Raines, J.M. (2014). Smart Ways to Use Smartpens: Personalizing Online Classes. *Journal of Student Success and Retention* 1(1):1-8.

[4] Powers, M.F., Bright, D.R. Bugaj, P.S. (2010). A Brief Report on the Use of Paper-Based Computing to Supplement a Pharmaceutical Calculations Course. *Currents in Pharmacy Teaching & Learning* 2(3):144-148.

1. **Capture**: Record lectures, workshops, and seminars with the Livescribe pen while taking notes that are synced with the recording. With the complete lecture/information recorded, students can focus attention on listening, rather than frantically annotating notes.

2. **Annotate**: Utilizing special notebooks, students may return to a specific annotation in their notebook and play back the recording that was captured at that moment.

3. **Review**: After class, students can return to parts of their notes and the respective synced recording that they highlighted as critical information. Students can then organize, create notes, and add supplemental material at their own pace. The Livescribe application also has handwriting recognition software, making the digitized notes searchable for quick reference.

4. **Engage**: Students can export the audio recording to then re-listen to lectures as needed.

Offering smart pens for circulation continues the Libraries' long-standing commitment of making technology accessible to students so they do not experience undue financial burden. If these pens become available through the Libraries, students will not have to spend money to try out this equipment and see how well it benefits them and will have a free opportunity to expand upon their digital literacy.

Livescribe pens are currently being offered to students registered with disabilities at other top public universities, including the University of California Berkeley (ranked number two), the University of Virginia (ranked number three), and the University of California Santa-Barbara (ranked number five). Team members were unable to find any university library in the country offering this service to faculty, staff, and all students, or on such a large scale.[5] Therefore, offering these pens the University of Florida can align itself with preeminent peer institutions and become a leader in making note-taking assistance available campus-wide through the library system.

Presently these pens are only available to a very small number of students of the DRC. This grant will be innovative for UF by making these pens available to all students, faculty, and staff on campus. In order to gauge the need of this program, the team took two approaches. First, we displayed a white board on the second floor of Library West for two days to gather feedback from students. All but one or two students enthusiastically said they would use the pens, with some adding that they would use them for class notes, drawing, and lesson planning. Second, we contacted faculty around campus to ask their opinions about the potential program. Here is what one professor had to say:

"…it seems students prefer to take notes in class using their computers. However, we all know that students learn better if they take notes by hand. Smart Pens seem to be the perfect solution: students take notes by hand but are able to convert them to digital files. It also seems like Smart Pens would be very useful for students with different learning styles and capabilities." - Victoria Pagán, Professor, Classics Department

Sustainability: The Smathers Libraries and Disability Resource Center support this proposal, will maintain the equipment as needed, and absorb any maintenance costs.

Timeline:

Timeline	Action	Responsible Parties
Summer 2019	Gather quotes and preliminary planning	Project Team
August 2019	Funds awarded	Fiscal Services and Grant Manager
August 2019	Equipment purchased	Project Team, Library IT, and Fiscal Services

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[5] The team found that the University of British Columbia Library loans eight Livescribe pens.

September 2019	Work with Library IT for UF Risk Assessment review of equipment items	Project Team and Library IT
September 2019	Cataloging and tagging of equipment items	Access Services and LW Circulation
September 2019	Equipment distributed to libraries	PI
October 2019	Equipment testing and staff training	Project Team
October 2019	Equipment advertised and promoted	Project Team and Director of Communications
November 2019	Creation of signage and instructional handouts	Project Team
November 2019	Update library webpages and library guides, including links to all instruction manuals	Project Team and Library IT
January 2020	Launch of Livescribe pens program	Project Team
Spring 2020	Instruction for use of pens	Project Team
Summer 2020	Assessment of usage, efficacy, and impact	Project Team and Laura Spears