# Implementing a One-to-One Technology Initiative in Higher Education

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**ABSTRACT**

*This paper describes the process of conceptualizing and implementing a one-to-one technology initiative at a regional comprehensive university. Organized around the principle that sustainable change requires attention to clear, justifiable goals, attention to key decisions, the development of stakeholder investment, adequate training, building appropriate infrastructure, and a concern for sustainability, the authors provide specific examples detailing how the change initiative in which they participated addressed each of those areas.*

**Keywords:** iPad, One-to-One technology, higher education, teacher education

In January of 2013, College of Education faculty at Southeast Missouri State University met to discuss the goals, mission, and future plans of the college. One of the group's conclusions that day was that the college needed to be more proactive about integrating emerging technologies into curriculum and instructional practices. During the same academic year, several school districts in the region were involved in planning or implementing one-to-one initiatives in which students in those districts would all be provided with a personal electronic device (PED) to use in the classroom and at home. Building upon the momentum created by faculty and P-12 partners, the Dean of the college began discussions with a several different stakeholders about the possibility of implementing a one-to-one initiative in the College of Education. In the fall of 2014, the university began distribution of iPads to nearly all students enrolled in the Teacher Education Program (TEP) under the auspices of a project that was by then titled EDvolution®. In the following pages we discuss many of the issues and decisions involved in developing and implementing our one-to-one initiative over that year-and-a-half.

While we intend that this narrative be of use to anyone involved in integrating new technology into an educational environment, the experiences documented here also provide specific examples related, generally, to making institutional changes. As such, this paper is organized upon the premise that there are certain areas to which change leaders must attend if they hope that a particular initiative will be successful and sustainable. These are

1. Clear, justifiable goals. Everyone integral to the project's success must have a clear sense of what the project is intended to achieve. At various junctures, project participants will have to make choices that may impact the potential for success. They must be able to make those decisions in the context of understanding the initiative's ultimate goals, and they need to be able to justify those goals within the context of the broader institutional mission.

2. Attention to key decisions. Early in the planning stage, key decisions need to be identified and addressed. A project can quickly unwind if, once started, long delays in critical decision-making sap momentum. In addition, key decisions made without appropriate research and reflection can lead to significant problems in later stages.

3. Development of stakeholder investment. The people upon whom the success of the project depends must believe in the value of the project. At various points—or throughout—the initiative will depend upon their willingness to invest their time, efforts, and (at times) money. They need to feel that there is a reason to do so.

4. Adequate training. Intellectual investment in a project is not a substitute for understanding one's role in it and having the knowledge and skills to carry out that role. Proper training for enacting those roles is essential.

5. Appropriate infrastructure. No matter how much stakeholders want to enact the identified changes, and no matter how well they are trained to do so, they will be unlikely to succeed if the environment in which they are asked to fulfill those new roles does not nurture their efforts. Their commitment will be undermined by the lack of resources necessary to be successful. Stakeholders would often rather function at their previous levels of success without the initiative's changes than face the significant risk of failure engendered by an environment that is not conducive to those changes.

6. A concern for sustainability. Change worth enacting is change worth continuing. In order to avoid having an initiative cave in under its own weight once leaders leave or become engaged in a new project, there must be long-term commitment to the goals of the project.

## CLEAR, JUSTIFIABLE GOALS

**Goals**

The goal of this initiative was to fully integrate the use of personal electronic devices (PEDs) in the teaching habits of our teacher candidates. While we chose to use iPads (see the following paragraph for an explanation of that choice), our goal was not explicitly to train teachers to use iPads. Instead, we aimed to prepare teacher candidates to teach effectively in P-12 environments that are increasingly 1:1. We wanted graduates of our programs to understand how PEDs could be used to increase student learning, regardless of the specific devices being used in particular schools.

**Justification**

Broadly, there were two main justifications for this initiative. The first is one that, ethically, must exist in any educational initiative: learning. We cannot justify dedicating scarce resources to a project that is unlikely to result in increased student learning. The second justification is grounded in external expectations. School districts in our region were increasing employing PEDs in their classrooms, and accrediting bodies were requiring evidence that we were preparing teachers to appropriately use available technology.

**Learning.** To begin with, we should note that our decision to integrate personal electronic devices into the instructional process was more responsive than progressive. By going "1:1", we did not change the way in which young adults learn. Instead, we simply acknowledged some aspects of the ways in which they were already learning—and exploited them. Students arrive at our university in the habit of using PEDs to text a friend or "Google" when they have a question. They are used to learning, at least about topics about which they care, by following one hyperlink to another. Across the nation, 85% of young adults, 18-29 years of age, own a smartphone (Pew, 2015). In short, they have an organic, communal approach to learning that is often facilitated by PEDs. The aim of our EDvolution® initiative, then, was to build upon the way in which students were already learning instead of continuing to ask them to leave their usual learning habits at the classroom door.

**External expectations.** Institutions do not exist in a vacuum. Investors, regulators, and customers are among the external parties that regularly exert pressure on institutions. In our case, we were most influenced by the potential employers of our graduates and the bodies that accredit our programs.

**Potential Employers**. In recent years, the demand that colleges and universities ensure that graduates are prepared to successfully transition into the workforce upon graduation has increased (Casner-Lotto & Barrington, 2006). School districts want to hire teachers who are "first-day ready" (NEA, 2013), and a piece of earning that designation is the ability to use the available technology. Moreover, administrators are looking for employees who have skills that are not necessarily dependent upon technology but that can be enhanced by the use of PEDs in an educational environment. These include the ability to work in a team and problem-solving skills (National Association of Colleges and Employers, 2014). In our own region, several school districts had already begun one-to-one initiatives, or were planning for them, when we started discussing the possibility of doing so ourselves. Not only did these districts desire teachers who could immediately be successful in such a wired environment, they wanted young educators who could provide professional development to veteran peers who had honed their skills in the days of paper and pencil.

**Accreditors**. Colleges and universities also have to meet standards set by accreditors, both institutionally and programmatically. In our case, the institutional accreditor is the Higher Learning Commission (HLC). HLC accreditation Criterion 3 cites technological infrastructure as one of the resources that an effective institution needs to provide. More specific to our initiative is the Criterion 5

expectation that "institutional planning anticipates emerging factors, such as technology, demographic shifts, and globalization" (Higher Learning Commission, 2015).

At the program level, the relevant accreditor is the Council for the Accreditation of Educator Preparation (CAEP). CAEP's standards include the requirement that "providers ensure that completers model and apply technology standards as they design, implement and assess learning experiences to engage students and improve learning; and enrich professional practice (Provider Responsibilities 1.5). Fully integrating the use of personal electronic devices into the curriculum and instruction of the college seemed a reasonable step toward meeting this standard.

## ATTENTION TO KEY DECISIONS

"A goal without a plan is just a wish," states an old axiom, and our goal was to achieve something more substantial than a wish. We began to identify the major decisions that would need to be addressed. Two of the most important centered on choosing a device and funding the initiative.

### Device

One of the most important choices in planning for a one-to-one initiative is, of course, the decision about the device that will be used. We considered a variety of factors in regard to this question, including whether or not we should limit ourselves to a single device. Our goal was not to prepare teacher candidates to teach with any particular device, but, instead, to empower them to exploit the capabilities of electronic technologies, generally, in order to increase P-12 student learning. One option, then, was to employ a "Bring Your Own Device" model, often simply referred to as BYOD (Microsoft, 2009). Allowing teacher candidates to interact using whatever devices they had at their disposal would have reduced the costs for both the candidates and the university, and it would have encouraged everyone involved to focus on activities that could be accomplished on multiple devices and platforms. However, we also needed to consider daily use requirements, screen size, storage capacity, platform (e.g. Apple OS, Android, Windows), security, capability to interact with the university's learning management system, availability of apps, e-text options, vendor support, and cost. A team that included end-users, IT personnel, and both college and university administration ultimately chose a one-device approach, with Apple's' iPad as the device of choice.

### Funding

While cost was a piece of the device discussion, the method by which the project would be funded was also a decision unto itself. Not only did we need to devise a plan for funding the initial expense of the project, but we also had to consider long-term sustainability. For example, a large grant to cover the cost of several hundred iPads would not have sustained the initiative for more than a few years. Many institutions make initial investments in technology without consideration for upgrades, lost devices, or the need to train new faculty (Mitchell, 2011).

The fact that we planned to provide iPads to the faculty was of particular relevance to the discussion of funding. We believed that this was necessary to encourage greater faculty investment in the project and to keep from placing an "unfunded mandate" upon them. Doing so, however, added significantly to the cost of the project. In addition, ensuring that faculty devices kept pace with changes in technology required us to plan for future upgrades. We wanted to avoid a situation in which faculty were using devices with less instructional capacity than those in the hands of student users.

From a cost perspective, the BYOD model was enticing. However, in addition to providing less consistency than one-device plans, BYOD also did not provide any of the financial structure necessary to maintain the program. In the end, we decided on a rental program that would allow us to capture the cost of faculty devices and infrastructure expenses from a pool created by student rental fees. The cost to students participating in PED rental plans varies widely between universities. For example, Winona State University requires a $485 per semester fee in exchange for both a tablet and a laptop (Winona State University, 2015) while Arkansas State University's institution-wide one-to-one model requires only a $50 rental fee per semester (Arkansas State University, 2014). At Southeast Missouri State University, iPad rental costs $200 per semester, which includes access to college-purchased apps, replacement insurance, an upgrade every two years, and the opportunity to purchase the device outright at graduation for a nominal cost (Southeast Missouri State University, 2015).

## DEVELOPMENT OF STAKEHOLDER INVESTMENT

A threat to any change initiative is a reliance on people who either do not fully understand the initiative or who have not been adequately prepared to successfully participate in it. From the start, EDvolution® had the support of a small core of enthusiastic individuals; however, such a large project, involving hundreds of students and faculty, required a network of support from a variety of stakeholders.

### University Administration

Central administration support was paramount from the early stages of discussion. The potential launch was first shared with the president's executive council. Justification was based on the issues cited earlier in this paper. The feedback of external constituents, such as local school district administrators, was also key in validating the program internally. Buy-in was also required by the faculty senate as our program was being mandated across multiple units within the institution. There were some initial questions regarding infringement on academic freedom by mandating iPad use. Executive staff support also ensured that the resources of time and effort would be committed from IT to support the program.

### Faculty

The foundation of faculty investment in this project was the fact that it grew out of legitimate concerns generated by that body. As noted above, a substantial proportion of the faculty cited the integration of new technology as a college priority. Even so, we realized that faculty belief in the project would need to be nurtured. A faculty technology committee was convened that included both early adopters and well as new users of educational technology. This group helped assess potential devices and user

expectations across the varying programs in teacher education, providing opportunities for faculty input on important issues.

The decision to provide faculty with an iPad as a part of the initiative was likely the step that encouraged the most investment, but receiving a new piece of technology would not have been enough on its own. Multiple professional development opportunities were provided to ensure that instructors did not become frustrated trying to determine how to use the device on their own. Lastly, although, in order to receive an iPad, faculty had to agree to use the device in at least one course during the first semester of implementation (with increased use in each subsequent semester), they were allowed to determine the strategies that best aligned with their course competencies. In short, faculty were provided with a device, expected to use it, and offered multiple layers of support in their efforts to do so.

**Students and Parents**

To be sure, many an educational initiative has navigated the treacherous straits between administrative and faculty support only to flounder on the shores of student rebellion. Not only did we need to engage current students in our teacher preparation program, but we also needed to find ways to communicate with those who had not yet applied to the program and, also, those who may not have even applied to the university yet. In light of this challenge, our launch included discussions with the education representatives on student government and the student leadership team for the dean of the college of education. We offered the general population of the college an opportunity to offer input at a convocation for all educator preparation students that included videotaping, and we shared information through mass e-mailings and posts on the college Facebook page. We also informed all incoming students about EDvolution® (and its associated costs) at new student orientations. Despite this multi-faceted approach to disseminating information, we still, unfortunately, failed to reach one important group of stakeholders: the parents of the impacted students. As a result, the university received a significant number of telephone calls—ranging from concern to heated complaint—during the initial implementation semester. Resolving to better communicate with parents, we have plans to send a letter with information about EDvolution® costs to the home mailing addresses of every student newly admitted. Marketing documents have also been enhanced to include more information about the iPad initiative.

## ADEQUATE TRAINING

No amount of passion for a project's goals can replace adequate preparation for the tasks required to meet those goals. All of us involved in EDvolution® had experiences in schools—both P-12 and higher education—in which excellent ideas had withered on the vine for lack of well-trained educators to nurture them. We resolved not to make the same mistake. Understanding that continued faculty and student investment in the project would be undermined by too many failed attempts to use iPads meaningfully in the classroom, we devised a multi-layered approach to professional development.

**Faculty**

Prior to implementation of the initiative, all faculty participated in the SAMR survey (Romrell, Kidder, & Wood, 2014) to determine their current level of instructional technology use. This assessment categorizes uses of educational technology according to the way in which it is implemented, from simply completing a traditional task with a new technology, through intermediate levels of augmentation and modification, to, ultimately, redefining the task of teaching through the use of electronic technology. The results of this survey helped us to identify the needs of faculty and to design experiences that conformed to those needs.

**Apple Workshops.** iPad was our chosen device, in part because of the variety of support offered by Apple. Company representatives met with faculty in the fall a year before teacher candidates received the first iPads in order to help define the college's vision. Once the university had committed to the initiative, faculty input again helped to influence its direction, with college personnel selecting the topics of the first two Apple sessions: literacy instruction and tools for differentiating instruction. Mid-way through the following year, two members of the university community were sent to Apple Academy to further enhance their knowledge of use of iPads in instruction. These two staff now serve as lead trainers for the initiative. Finally, a lead Apple instructor came to campus and offered one-to-one tutoring and live observational feedback to faculty desiring such support.

**Ongoing Professional Development.** Some degree of iPad training was mandated for all users. Faculty did not receive their personal iPad until they had committed to a training date and signed the user agreement. This initial professional development ensured that faculty began using their devices with at least a minimal level of knowledge. These were hands-on workshops that provided instructors with opportunities to observe others accomplishing teaching-related tasks with iPad apps and allowed them the time to explore those apps themselves. In addition, the early versions of these sessions included dozens of faculty members from a dozen different departments, encouraging lively interaction across the institution that increased excitement about the initiative.

Hoping to build upon momentum instigated by the initial trainings and fed by subsequent classroom experiences, we have endeavored to provide faculty with a variety of opportunities for additional professional development. Some departments have designated time in department meetings for faculty to share experiences and apps, and we regularly promote workshops offered by university personnel, such as *Take-Away Fridays*, where lunch is provided and some aspect of educational technology shared. Relevant sessions have included training with apps such as Nearpod, iMovie, and ClassDojo. The fact that our own faculty have led some of these sessions has only increased interest. Perhaps the most interesting of our professional development opportunities has been *Appy Wednesdays.*

**Appy Wednesdays.** In addition to the formal professional development offered, the college also wished to create a climate of shared learning with our students. We developed a monthly open meeting, *Appy Wednesdays*, to which both teacher candidates and faculty are invited to share new-found or favorite apps. Early meetings included prizes to incentivize attendance, but the opportunity to share with and learn from other educators has kept attendance growing. In particular, teacher candidates

seem to be excited by the opportunity to offer something of value to the teaching community on campus.

**Three-Phase Introduction for Teacher Candidates**

The student professional development model resembled the faculty program but with shorter training sessions. While both groups began with an introduction to the iPad and its major functions, subsequent faculty development was not linear and consisted of different experiences for different instructors. The professional development of teacher candidates, however, was based upon a more organized conceptual model that overlay the four-year university experience. This structured approach allowed us to intentionally and gradually integrate iPad use into the academic and professional lives of our students. Table 1 illustrates this three-phase framework.

Table 1
*Three-Phase Technology Introduction Framework*

| Phase | Years | Characteristics |
|---|---|---|
| *Tech for you*: Technology as a tool to enhance your own learning and personal productivity | 1-2 | • Student out-of-the box basic use seminars<br>• Drop-in  support in the Instructional Resource Technology Center *Appy Wednesdays*-once a month collaborative sharing between faculty and students regarding a specific app |
| *Tech for us*: Technology as a tool for collaboration and instruction in education coursework | 2-3 | • Explicit in-class use<br>• Focus on collaboration between the student, peers, and faculty |
| *Tech for them:* Technology as a tool for instruction to enhance the learning opportunities for all learners | 3-4 | • Application of effective educational technology in field experiences and student teaching |

**Tech for You**. The first phase, *Tech for You,* focused on introducing students to ways in which their PED can assist them in their studies. In effect, we wanted them to experience how use of the iPad can be beneficial so that they will be better able to help their students benefit similarly. We mandated out-of-the-box training for all new student users to ensure a minimum understanding of the uses of the iPad for their own learning. The iLife suite and note taking applications such as *Notability* were shared. We also made sure that students were aware of *Appy Wednesdays,* and we encouraged them to attend.

During the semester, students were also offered seminars on specific applications. These trainings were conducted by a graduate assistant in the college instructional technology lab.

**Tech for Us.** The second phase of the model is called *Tech for Us.* Early in this phase, teacher candidates began taking some introductory courses related to teacher education, creating more time for structured interaction between students and faculty in the college. During the *Tech for You* phase, students were still largely enrolled in general education coursework taught by university faculty who are often not involved in the one-to-one initiative, making it difficult to influence classroom activities. In this second phase, however, college instructors began to emphasize the collaborative capabilities of personal electronic devices. Teacher candidates began to use iPads, not simply as a tool for individual learning, but also as a tool for building an educational community. Faculty were the lead agents in this training phase for students because they require app use specific to discipline coursework, created lesson plans that integrated technology when appropriate, and required mastery of specific technology relevant to the discipline.

**Tech for Them.** In the final phase, *Tech for Them,* the focus shifted toward the students that our candidates would teach in P-12 classrooms, although fall of 2015 will be the first semester in which we will have students in the *Tech for Them* phase who have participated in each of the other two phases. Having developed their own capacity to learn and collaborate using PEDs, they will be in a position—during these last few semesters of their university career—to model these practices for their students. By this point, they will have developed a personal library of apps suited to their teaching styles and subjects, and they will have had opportunities to observe faculty and peers using many of the apps in varying contexts.

## APPROPRIATE INFRASTRUCTURE

We spent the year before the launch addressing required infrastructure needs. A strong collaborative relationship with academic leaders and instructional technology personnel was a necessity. We had to articulate the types of activities that would occur in learning spaces so that IT could strengthen the current system to meet our demands. The primary issues included the amount of Wi-Fi capacity needed, classroom hardware and software needs, processes for the distribution and return of iPads, billing of student accounts, and procedures for lost or stolen devices.

**Wi-Fi Capacity.** A needs analysis of Wi-Fi demand was critical to the launch of the one-to-one initiative. Users could be expected to bring two or three devices into the learning spaces, straining the bandwidth capacity and slowing down use of devices in the classroom. In turn, this decrease in service would result in student and faculty frustration. To prepare for this situation, IT added several access points in the learning spaces. Ironically, one result of this attempt to be proactive was the oversaturation of Wi-Fi access, with devices unable to determine the best access point. This ultimately led to a decrease in Wi-Fi usability during class time, not because there was not enough access, but because devices had difficulty choosing between too many options for access. This issue was eventually corrected by changing the device management system to force access to the closest point.

Strategies also had to be implemented to regulate the load demand based on differing class activities. For example, we requested that faculty assign the downloading of specific apps as a homework assignment since a large app download by 25 simultaneous users may result in a several users losing their connections. The load demand resulted in the need to increase the university wide bandwidth to handle the expanding use throughout the campus. In addition, we had to assess the Wi-Fi use in non-instructional areas, such as in a Subway and a Starbucks that share our building. The network needed to be able to withstand the lunch hour rush as well as the instructional demands of a one-to-one initiative.

**Classrooms.** Preparing the instructional environment was as critical as the professional development of the faculty. Each classroom required new hardware to promote device interaction. Primary hardware changes included the addition of Apple TV or AirServer to allow multiple users to share one classroom projector. AirServer was used in most classrooms because it was the less expensive option, but Apple TV was included in improvements to the Instructional Technology Resource Center. Both tools allow password control to prevent students in the hallway from disrupting a classroom by taking over the projector.

During early implementation, it was important to have all technology failures in the classrooms documented and reported centrally. Decreases in service and other user concerns had to be addressed by the IT department quickly. Lost instructional time due to failures of the technology could quickly lead to reduced use of the devices and, in turn, a decrease in support for the initiative as a whole. Given the cost to students, we made addressing poor connectivity and other service issues a high priority.

Software purchases included a device management system for tracking all iPads and for pushing apps to users. We also created a master list of preferred apps for students to download based upon major. We chose to limit the list to free or "starter" apps during the initial launch to avoid burdening students with additional costs.

**Instructional Resource Technology Center.** Finally, community spaces such as computer labs and instructional resources areas were impacted by the movement to one-to-one. Charging stations were added for both students and faculty use. Collaborative learning stations were needed to allow students to use their personal devices in the center. The space also needed to provide access to the peripherals used by faculty to promote competency by student users. Remodeling of our center included adding a "practice room" that provided both high-tech and low-tech tools for students to practice lessons before implementation in a real classroom. Spaces were also created to facilitate lecture capture for "flipped" lessons. Larger collaboration spaces were developed for micro-teaching activities both in and out of class. Also a graduate student was hired to provide assistance to students in using the technology. Moving forward, we are hiring a full-time coordinator for the center.

## A CONCERN FOR SUSTAINABILITY

Ensuring that institutional changes will last beyond the initial period of novelty-driven energy requires the development of both internal and external support. Data must be collected that can illustrate early success. Outside stakeholders must be convinced that the initiative has value so that they will work to

sustain it after initial project managers have moved on to another initiative. Critical to the initial launch was to document success and impact of the program. The SAMR survey was administered one year into the implementation of the one-to-one initiative to document the changes in faculty technology use. This data has been used to engender continued support. We also disseminated numerous media releases describing the impact that the curriculum changes were having in P-12 classrooms during our students' field experiences. Employer feedback regarding students' ability to implement technology was also collected.

Infrastructure changes must also be a part of the long term sustainability plan. We are reducing costs in desktop computer replacement due to the elimination of a traditional computer lab-style classroom that previously was used to teach technology skills. In addition, a clerical position was eliminated in our IRTC to support the hiring of a new instructional technology coordinator. This person will be able to support ongoing professional development for students and faculty. Grant and foundation funding are being explored to address hardware deficiencies that have been identified in the past year. We also launched a capital campaign to purchase new BYOD work stations in the center. The rental model also supports the sustainability of the project by facilitating device updates every two years. This enables us to have the flexibility to adapt to evolving technology. Classroom infrastructure will continue to require updates related to new technologies, since both software and hardware rapidly evolve (Amirault, 2015). Peripherals must also be purchased to demonstrate best practice. Examples of such tools include sleeves that transform a device into a microscope, three dimensional imagery tools, and tripods that allow the camera to follow a teacher in the classroom.

## CONCLUSION

The start-up challenges of a new project are now being replaced by those tasks associated with building and maintaining long-term change. Contentment with daily, incremental improvements must now suffice in place of the passionate enthusiasm of the novel. Structural supports related to physical infrastructure, device distribution, and professional development are now in place, but they must receive adequate attention in order for us to build upon the work done so far. The continuation of our EDvolution® also depends upon the strength of the stakeholder relationships that enabled us to begin the project. Although it is often more difficult to excite faculty, students, and university administrators about a project that is, by the standards of higher education, nearing middle-age, the initiative will not last without their continued support.

In addition, we need to focus more attention on assessing the value of EDvolution®. The initiative was built upon a sound theoretical and philosophical framework, but that does not guarantee that it will result in our meeting the identified goals. We have considerable anecdotal evidence of altered classroom practice and innovative student use of iPads. We have also received some positive feedback from school administrators. Building upon this initial informal data, we are currently developing more systematic quantitative and qualitative methods for evaluating the success of the project.

Certainly the rollout of our one-to-one initiative has not proceeded without problems, but we have managed to avoid several potential roadblocks by attending to the six key areas we identified in the

introduction: 1) clear, justifiable goals; 2) attention to key decisions, 3) the development of stakeholder investment, 4) adequate training, 5) building appropriate infrastructure, and 6) a concern for sustainability. The presence of these target areas helped us to maintain focus and ensured that we did not overlook (for the most part) important issues that might undermine the success of the project.

As the name suggests, EDvolution® has required a level of effort and planning commensurate with starting a minor revolution. Our aim was not simply to add a new tool to the instructional process, but, instead, to fundamentally alter that process in our college. Believing that a more collaborative model that enhanced connections between students, faculty, and worldwide sources of information would increase student learning, we set about to use emerging technology to build that model. Not only did we perceive a value for our teacher candidates' immediate learning, but evidence suggested that our one-to-one initiative would also better prepare those novice educators to meet the needs of students in their future classrooms.

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