Models of Instruction

Personalized Learning

The term “personalized learning” has reemerged in recent years and is now one of the most popular instructional strategies being discussed in K-12 education. Everyone has jumped on the bandwagon, from software and hardware vendors, to conference planners and book publishers. While the term can be traced back to the 1960s, a half a century later there is still no clear agreement on its definition.

Americans like to have choices and be in control of our own lives, so it makes sense that educators support learning strategies which allow students to personalize his or her own learning. The truth is, however, that most of what is being labeled “personalized learning” is really other instructional strategies that have long existed under different names. Recently, academics have begun describing this phenomenon. What proponents are often labeling as personalization is really “concept-based practice embedded within differentiated instruction” (p.1).^{2}

Regardless of the names given to these instructional strategies, the movement toward assessing what a student understands and does not understand, and then customizing the instruction each student receives based on those assessments is a step in the right direction. Most
comprehensive digital curricula embed some form of initial assessment that sets the level for each student. Many of the products on the market today also have content that adjusts as a student works through the questions that accompany the content. If the student answers a question wrong, the program may move to a different line of questioning to further the student’s understanding. The program may also provide content and questions to remediate the student’s gap in knowledge or understanding.

What the Research Says

“The investigation of science proficiency levels indicated that “mandated” technology integration through regular classroom observations is not effective, but a culture where the technology is naturally used in innovative ways is connected to increased proficiency levels in comparison to the state” (p. 6). Although this result does not call out personalized learning, per se, it does allude to the possibility that better results can be found when technology use is not mandated. The concept of choice, which is one of the foundational components of personalized learning, may be a factor in more effective integration of technology, which leads to better student outcomes.

In that same data, increased use of games, simulations, collaboration tools, social media, and communication tools showed a positive relationship with proficiency levels for elementary school science, middle school science, and high school mathematics in relation to the state. The use of these tools have shown in previous studies to increase student engagement, which ultimately can lead to increased student achievement. Increased student engagement may stem from a student’s feeling of empowerment and autonomy during the learning process. Both empowerment and autonomy are also elements of the personalized learning experience.

An anomaly in the data can be found in the results related to the increased use of the three types of 21st-century tools on high school reading scores. The Signature Districts showed a negative relationship with proficiency level for high school reading compared to the state. One theory is that these tools may distract students from staying on task, which leads to lower achievement results. The researchers, however, believe that the poor results were not driven by distraction, but possibly by new skills required by a shift in content standards. High school students are now being required to demonstrate their ability to analyze text and write a coherent argument, which is a shift from almost exclusive use of multiple-choice questions. This finding may also be an indicator that high school educators are more reluctant to change their pedagogy and are still primarily relying on direct instruction controlled by the teacher.

Findings From Other Models

Rocketship

There are several models that have emerged which focus on personalized learning.
Rocketship is a charter school system that extensively uses self-adjusting content programs to individualize much of the learning experience for students. The schools have come under attack because of the amount of time students spend isolated in front of the computer. Students wear headphones while working through the curriculum, which can further increase their sense of isolation. Some reports have stated that people monitoring the students while they work strongly discourage students from going to the bathroom or making any type of contact with other students in the room.\(^4\)

Rocketship’s results have been mixed, with some schools enjoying achievement growth, while others have seen declines. Some believe that the issue is in the fidelity of implementation, but according to Education Week, “Some Rocketship leaders acknowledge that their original blended learning model … may be more effective at teaching students to follow directions than to think for themselves” (para. 5).\(^5\)

Nexus Academy

Nexus Academy articulates their vision for personalized learning in their belief that “students are most successful when their studies meet their personal goals, interests, and abilities” (para. 1).\(^6\) Nexus staff work with students to create customized education programs to match each student’s goals, interests, and abilities. The strengths, needs, and goals are evaluated upon enrolling in the school and lead to the development of a personalized learning plan. Then, as students begin working through the digital curriculum, onsite and virtual teachers, along with Success Coaches monitor daily data about student performance and adjust the personalized learning program as needed.

There have been no longitudinal studies conducted on the Nexus Academy system or their individually operated schools. This is most likely because the program is new. There are also no aggregate studies of all of the Nexus schools in the United States or around the globe.

Data on the schools are available through reports from the program’s former accrediting agency, AdvancED.\(^7\) However, available data have not been part of a formal matched-pair, quasi-experimental study. In the area of academic achievement, the reports include percentages of students who are proficient based on their state standardized test scores.

Below are results provided in the 2016 report for Nexus Academy of Columbus. The percentages are of students who passed Ohio’s State Tests in English Language Arts, Mathematics, Science and Social Studies.

- Nexus Academy of Columbus: 92.5
- Ohio average: 91.8%
- Franklin County average: 82.7
- Although this school’s overall passing rate is average, English Language Arts has the highest passing rate of 97.9%—higher than the statewide average of 94.3%.

The results from Nexus Academy of Columbus are considered average by the state. Results in other locations have been mixed.
The idea of personalizing learning is not new. The American elite educated their children using one-on-one instruction provided by “readers” and the research is clear that this is a vastly better approach than the whole-group instruction found in most schools. An often cited study in this area is the 1984 research led by education psychologist Benjamin Bloom. Bloom found that students given one-on-one instruction consistently performed two standard deviations better than their peers in a regular classroom.8

The academic literature is also littered with research on “self-regulated learning,” which conceptually is the same as most technology-enhanced personalized learning programs. As can be seen by the examples above, self-adjusting content administered in an individualized way may result in proficient results. However, these programs are not dramatically improving student achievement. The learning process is complex, and there are more pieces to the puzzle. The most effective pedagogy and instructional strategies need to also be aligned with the type of learning and the learning outcomes one desires. Not every pedagogy is appropriate for every type of learning. Content in school is basically divided into two main categories—concepts and skills. The way the brain learns to ride a bike is very different than the learning necessary to understand abstract concepts and be able to use them in new and novel ways.

**Pedagogy**

The math teacher wants her students to understand how multiplication works because it is an important concept that students will build on as they advance to higher levels of math. She has her students use manipulatives to create groupings that represent numbers. By making the concept visible through the use of manipulatives, it is much easier for a novice to grasp. Students are given opportunities to guess how multiplication works and create physical representations of their theories. After collaborating with their classmates to find the best solutions, they begin to come up with their own questions that they want answered, which leads to higher levels of engagement.

There is an old saying that no one can be rightly taught until he/she feels a real need in their life or in their work. Because the questions are theirs, they authentically represent what the individual student needs to understand, and they are more likely to want to find the answers. In this scenario, the teacher’s role is to help students focus their questions, and guide their thinking as to where they might find answers. At the point when students begin to generate their own questions to clarify their thinking, they unknowingly begin to tap into their existing neural networks. The process of refining their thinking helps strengthen their existing neural pathways, and provides opportunities for the connection of other networks into the original, and now strengthened pathway. Each new path to the memory grows the overall network and makes it easier to access the information or conceptual understanding in the future, and use that information to make meaning in other contexts.

This conceptual work is incredibly important in building an understanding of how the world works, and provides a sturdy
foundation on which to develop further understandings. But is this time consuming work always necessary, or even preferable? What if the students need to complete several dozen multiplication problems on a test, or more important, need to quickly calculate a tip when paying their restaurant bill? Would the student need to pull out their Cuisenaire rods in order to figure it out? Obviously, this method would not be practical. In such a situation, it would be better if the student had the basic computations memorized. The difference is that the understanding of multiplication is conceptual, while multiplying is a skill.

Skills take repetition and feedback to develop. A basic rule of thumb is that a person has to spend 10,000 hours to perfect a skill. Ideally, the skill is practiced so much that the brain does not have to consciously think about it in order to come up with an answer. This type of learning is vitally important if you want to play an instrument or a sport. If a performer, for example, had to think through every physical action it takes to create sound before performing each note they would never be able to create music. Likewise, if an athlete thought about every physical movement they needed to make prior to moving they would never be able to defend an attack, connect a pass, or score.

What the Research Says

It is clear that the pedagogy needs to fit the desired learning outcome. An example of this phenomenon can be found in the Project RED Key Implementation Factors (KIFs). One of the original findings is that using technology in interventions on an ongoing basis leads to higher student achievement. Take, for example, a young student that is struggling to identify various phonemes. That student can use a game-based program to practice identifying sounds over and over. The practice is fun for the student if the game is designed well, and the learning that this individual student needs is being very specifically addressed. In the analysis of Project RED’s Signature District data, researchers at The Center for Research in Educational Policy (CREP) at The University of Memphis found that middle and high school technology interventions led to increases in math/science on state standardized test scores. In fact, math and science gains were also seen in relationship to all of the KIFs. The researchers noted, however, that technical onsite challenges reduced achievement gains.

Assessment

Every educator understands that it is important to use data to understand student proficiency and progress. Schools have used primarily summative data since the inception of the public school system to understand if students are proficient on a topic or where they have gaps in their understanding. The problem with this is that summative assessments come at end points in the learning process. Because the class continues on regardless of the grades students receive, the students may never learn the content or understand where they may have deficits.

Formative assessments, on
the other hand, are designed to provide crucial ongoing feedback to teachers and students. In the mid-1960s, Tyler, Gagne, and Scriven began espousing the theory that providing frequent feedback and corrective actions to students would result in higher achievement. This theory was further developed through the work of Bloom, Hastings, and Madaus. Bloom et al. believed that teachers should use their classroom assessments as learning tools, and then follow those assessments with feedback and corrective procedures. In other words, instead of using assessments only as evaluation devices that mark the end of each unit, Bloom et al. recommended using them as part of the instructional process to diagnose individual learning difficulties (feedback) and to prescribe remediation procedures (correctives).

In his 1968 work, Bloom alone outlined a specific instructional strategy to make use of this feedback and corrective procedure, first labeling it “learning for mastery,” and then shortening it to simply “mastery learning.” With this strategy, teachers first organize the concepts and skills they want students to learn into instructional units (typically about a week or two of instructional time). Following initial instruction on the unit, teachers administer a brief formative assessment based on the unit’s learning goals. Instead of signifying the end of the unit, however, this formative assessment is intended to give students information, or feedback, on their learning. It helps students identify what they have learned well to that point and what they need to learn better.

One-to-one environments empower teachers to cultivate these principles within their classrooms. By capitalizing on the greater frequency and higher-quality formative assessments, teachers are better able to ascertain each student’s level of understanding and design learning tasks that are individualized. Technology can assist with this process by, “Increasing opportunities for learners to receive feedback from software tutors, teachers, and peers; to engage in reflection on their own learning processes; and to receive guidance toward progressive revisions that improve their learning and reasoning” (p. 243).

When this feedback is automated and self-adjusting through content software, it provides efficiencies that would not be possible for a teacher to manage without the technology. The most significant aspect of a curriculum product, however, may be its ability to allow each student to proceed through a series of learning tasks at his or her own pace in an engaging way. When this is used in tandem with self-regulating strategies, students can begin, in a functional way, to take ownership of their learning.

CREP researchers also substantiated these findings. When elementary students used technology in the Project RED Signature Districts, and it was tied to a formative evaluation system, students achieved higher academic results.

**What the Research Says**

CREP researchers found that systematic, written plans for collecting data correlated to increased math/science achievement. In fact, there was an overall rise in the collection and use of data across the Signature Districts during the study period. Although a number
of the Project RED Signature Districts are attempting to use more formative assessments, the Signature District Survey results show that the majority of data being collected is summative, and therefore, doesn’t inform what districts are learning or how things are changing because of their data collection efforts.

Furthermore, the data showed that there is a disconnect between districts and their elementary schools on the best way to monitor and make adjustments to one-to-one implementations. Without formative data, educators are left to anecdotal evidence and their individual experiences to assess the overall effectiveness of a strategy. In the absence of internal assessments, and an external evaluation, there is no baseline data to compare to, no outcomes data to analyze against the baseline, and no credible way to determine effectiveness of the various implementation methods districts are using, or may wish to employ.

For the high schools, the strongest findings were the positive correlations between the survey and proficiency levels for reading and mathematics relative to the state, while for science, proficiency outcomes were statistically significant and mostly negatively correlated with the survey. The negative statistically significant findings for science proficiency levels were related to the same questions that had negative correlations for both elementary and middle schools. The same conclusion, therefore, applies:

The statistically significant and positive findings related to proficiency levels for reading and mathematics indicate that a written plan that includes systematic collections of data from teachers has a positive relationship with increasing reading and mathematics scores in comparison to the state. (p. 6)

One surprising result was that the use of technology in intervention classes did not yield better results in the Signature District elementary schools. This may be attributed to a number of factors, including the amount of time on task, the quality of the software solution, the effectiveness of the device, and student and teacher perceptions of technology, to name a few.

Implications

With multiple decades of research showing the positive effects of formative assessment, and the potential for technology to enhance these effects, it is troubling to see the amount of time districts spend collecting summative data and attempting to extract actionable information from annual summative test results. Schools spend a tremendous amount of valuable instructional time and money testing. It is not uncommon for a district to administer benchmark tests, quarterly tests, end-of-unit tests, subject competency tests, and then state standardized tests. It is important to benchmark student progress, but is it necessary to do so in five different ways, as the example above would indicate?

Policy Level

Policymakers have looked to higher standards and more accountability measures as the strategy to improve learning outcomes since the publication of *A Nation at Risk* in the 1980s. After decades of increasing
summative testing, and using punitive measures to ensure compliance, student achievement has remained relatively flat. If the goal is to improve student achievement, it may be time to explore different policy approaches that take into account the importance of using ongoing formative data, aligning teaching methods to the desired learning, and looking for ways to meaningfully engage students and their families in the learning process.

Local Education Agencies (LEAs)

When an LEA administers the typical summative assessments each year (and schools are using even more) it could potentially result in as much as a month of lost instructional time. If one considers that the data cannot appropriately be used to understand an individual student’s progress and understanding, and does not provide information to teachers so they can improve day-to-day instruction, this practice begins to look at best futile, and at worst, abusive. LEAs need to evaluate their assessment strategy and ensure they are generating data that is going to be the most meaningful to the learning process. This may mean having to take a public stand and advocating for a balanced assessment approach that has the most potential for positive outcomes for students and learning.

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References & Notes


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