REGULAR BOARD MEETING

1. The Board meeting was called to order at 6:02 p.m. by Chairperson Harmon.

2. The roll was called and a quorum was declared. The following Board members were present with a total of 631 votes:

   **Present:**  R. Bowley  C. Libby  
   N. Carlow  C. Meserve  
   R. Deakin  J. Moses  
   A. Dube  A. Payeur, Jr.  
   L. Harmon

   **Absent/Excused:**  J. Bruni  M. Nadeau  Z. Sturgeon

   **Others:**  P. Penna  M. Roy  H. Smith

3. Pledge of Allegiance

4. **Moved by Ms. Bowley; seconded by Mr. Payeur:**

   To accept the agenda for the March 19, 2018, regular Board meeting as presented.

   **VOTED:**  “Yes,” Unanimously

5. There were members of the public in attendance who had an interest in addressing agenda item #6. There were no other members of the public who wished to address the Board.

6. Mr. DiRenzo, Advisor to the Bonny Eagle Robotics Team (BERT), approached the podium. He invited Team Captain Christopher Hascall to the podium as well to report on BERT’s most recent competition. Mr. Hascall stated that BERT had won all playoff matches during the competition. He said, “It was an amazing competition.” The most recent “win” qualifies the team for the FIRST Championship Competition scheduled to be held on April 25 through 28 in Detroit, MI. A video of one of the matches was viewed by the Board.

   Mr. Harmon recognized Mr. Colin Walsh, parent of BERT’s lead driver. He acknowledged that the robotics program had helped his child to learn how to share, to communicate with others, to succeed, and to be a leader. He said that the program provided an opportunity for like-minded children to be successful. Mr. Walsh stated that he believed his son would not be where he was today without the robotics program and the leadership of the District.

   Mr. Harmon reported that $10,000 had been added to the 2017-2018 District budget in a line marked for “activities-robotics” which had been recommended
by the MSAD 6 Board of Directors and approved by the voters of MSAD 6. Currently, there is $8,500 available to BERT that would not need the approval of the Board. Mr. Harmon went on to say that Policy Code BIE-R presents guidelines for the Board in making decisions with regard to funding co- and extracurricular activities that move on to post-season competition.

Mr. Harmon recommended that the Board approve the expenditure of up to $1,500 from the Board’s Public Relations account to be used in funding BERT to go to the FIRST Championship Competition. Mr. Harmon also recommended that the Board hold a greater conversation on how robotics would fit into the curriculum and how best to fund the program.

Moved by Ms. Bowley; seconded by Ms. Meserve:
To suspend Policy Code BIE-R and to give the Bonny Eagle Robotics Team up to $7,365 from the District’s contingency fund in order for the Team to compete in the FIRST Championship Competition in Detroit, MI.

Discussion:
- **What fundraisers are BERT conducting to help raise funds for this event?**
  The Team holds a bottle drive every month. The next one is being held on April 7. There will be a car wash on April 21, and plans are being made for a Krispy Kreme Doughnut fundraiser. Sponsor letters are being sent to those sponsors who did not donate this year, and the Team is requesting donations on their Facebook page.

- **How many students will attend the competition?**
  There are 32 students on the Team.

- **How much money do we have in the contingency fund?** *As a Board, we should know what that number is.*
  Ms. Bowley reported that there was currently $463,531 available in the contingency account.

- Mr. Deakin stated that he would support the motion on the table. He did ask, however, that before the budget process was finished for the next school year that the Board think about how to fashion next year’s budget for teams like BERT. He stressed that it would be important for other teams and clubs such as the theatre program to be able to access funding as well.

- Mr. Harmon noted that the District budget was not approved to go before voters without first gaining approval from the Finance-Facilities Committee and the full Board. Conversations around making the program a part of the District’s curriculum must include the Superintendent, the Assistant Superintendent, the Curriculum Coordinator, and the District Curriculum Committee. He did encourage Board members to review Policy Codes BIE and BIE-R to see if any revisions were needed.

- Mr. Dube explained that policies were drafted in order to give guidance to Board members in decision-making and to help the Board to have a “big picture” view. He raised his concern about budget cuts that the District
might be facing in the very near future and cautioned Board members in their use of contingency funds. He noted that by suspending policy, it could create a situation where there may not be equitable support for other groups or individual students. He cautioned Board members in how they approved funding.

VOTED: Yes 554
      No  77 (Dube)
      Abstained  0
      Total:  631

The motion has passed.

7. Mr. Harmon recognized Middle School Teacher Stephen Avery who gave a presentation on “Literacy Skills and 3D Pens for Enhanced Engagement.” Mr. Avery introduced himself by saying that he has been a teacher in the District for nine years, a graduate of Bonny Eagle High School, and a parent of two students in Hollis Elementary School. He shared two articles with the Board and asked the Executive Secretary to scan them and send them to the Board (see attached).

Mr. Avery opened the presentation with the following statistics:

- All but 4% of children who read proficiently in third grade will graduate from high school on time.
- All but 9% of children who were basic readers graduated from high school on time.
- 82% of children who fail an English course in middle school fail to graduate from high school.

Mr. Avery shared the goals of the Reading Lab at Bonny Eagle Middle School as follows:

- Provide students encouragement and environment to develop a relationship with reading.
- Remediate and support growth of underlying abilities and skills:
  - Word study
  - Fluency
  - Vocabulary development
  - Comprehension strategies
  - Engagement strategies
- Students are identified for support through assessment data and through consultation with teachers, parents, and administrators.
- Students attend class every other day for 45 minutes. We work to improve literacy practices within Bonny Eagle Middle School. Coaches work with staff to provide on-gong, imbedded instructional development and support.
Mr. Avery stated that he has employed 3D pens to enhance engagement. He explained that 3D pens were similar to 3D printers with the notable distinction being that the user controls the design rather than the computer. This allows for greater flexibility and an entry point for beginning users. The design and application is limited only to the user’s imagination. Mr. Avery acknowledged that it had been a good tool to work with for some disengaged readers.

**Discussion:**

- **How many students do you have every other day?**
  Six to thirteen students.

- **Is that enough time?**
  For some students—“yes.” The problem, however, is that some students could benefit from more time. If they came five days a week, they would be missing out on another allied arts course.

- **As important as those other allied arts are, if students are still deficit in reading, they run the risk of being one of the statistics, correct?**
  That is correct.

- **Mr. Deakin noted that statistics show that one cannot wait until high school to make change for students. In order to improve our graduation rate, changes have to be made at the lower grade levels. He also added that when people read, they obtain models of proper grammar. Students are presented with best examples when they read.**

- **How does reading affect writing?**
  One affects the other. Mr. Avery said that teachers need to encourage reading, writing, thinking, speaking, and listening.

Mr. Avery invited the Board members to visit the Reading Lab.

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8. Due to the excused absence of Student Board Representative Zeke Sturgeon, no Student Report was given this evening.

9. **Moved by Ms. Bowley; seconded by Mr. Payeur:**
   To accept the consent agenda as presented.
   a. Approval of the March 5, 2018, Regular Board Minutes
   b. Co-Curricular Appointments for the 2017-2018 School Year:
      *(Candidates do not violate Policy Code BCC and hold valid CHRCs.)*

   **Bonny Eagle Middle School**
   - Pathfinders Trip Leader, Grade 6: Kimberly Branchina, $1,048.00
   - Pathfinders Asst. Trip Leader, Grade 6: Rebecca Hutchins, $520.00
   - Pathfinders Asst. Trip Leader, Grade 6: Kenneth Lattari, $520.00
   - Pathfinders Trip Leader, Spring Boys: Lukas Buchanan, $1,048.00
   - Pathfinders Asst. Trip Leader, Spring Boys: Brett Levin, $520.00
   - Pathfinders Asst. Trip Leader, Spring Boys: Oisin O'Searcoid, $520.00
   - Pathfinders Trip Leader, Spring Girls: Kristin Klin, $1,048.00

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**EDUCATIONAL PRESENTATION ON LITERACY SKILLS & 3D PENS, CONTINUED**

**STUDENT REPORT**

**APPROVAL OF THE CONSENT AGENDA**
Continued,

| Pathfinders Asst. Trip Leader, Spring Girls | Ana Abbott | $520.00 |
| Pathfinders Asst. Trip Leader, Spring Girls | Sara Otis | $520.00 |
| Pathfinders Asst. Trip Leader, Spring Girls | Suzanne Simmons | $520.00 |

**VOTED:** “Yes,” Unanimously

10. Mr. Harmon presented the Board Chairperson’s Report as follows:
   - Mr. Harmon reminded the public that anyone wishing to run for a position on the MSAD 6 Board of Directors during the June 12, 2018, election must have their nomination papers delivered to Central Office no later than 4:00 p.m. on Friday, March 23.

11. Mr. Penna provided the Superintendent of Schools Report as follows:
   - The list of support staff hires and resignations for March 1 through 15, 2018, was included in the Board agenda packet for Board members to review.
   - Mr. Penna reported that Ms. Catherine Bunk, Elementary Teacher on leave from George E. Jack Elementary School, retired effective March 14, 2018.
   - Mr. Penna announced the following educational field trips:
     - H. B. Emery Jr. Memorial School 5th Grade Students will be traveling to the Boston Museum of Science in Boston, MA, on April 26, 2018
     - Bonny Eagle High School Theatre Program Students will be traveling to Windham High School in Windham, ME, on March 22 through 24, 2018, to compete in the Maine Drama Festival State Championships
   - Mr. Penna announced the acceptance of the following donations:
     - Thank you to the following people and organizations for the donations given to support the District’s Special Olympics Fundraiser “The Harlem Wizards:"
     - Rick and Ray's Machine Shop $40.00
     - New Leaf Salon and Spa $25.00
     - Under the Stars Entertainment $100.00
     - Aubuchon Hardware $68.99
     - Your Country Store $40.00
     - The Myrick Family $50.00
     - Paul Lawrence and Family $50.00
     - The Verrill Family $250.00
     - The Getchell Family $250.00
     - EA Scribner Insurance $200.00
     - Hollis Lions Club $25.00
     - Standish Dominos $150.00
     - Buxton PTO $25.00
     - BEMS PTO $200.00
     - Town Line Restaurant $25.00
     - Probably Auto $50.00
**SUPERINTENDENT REPORT, CONTINUED**

<table>
<thead>
<tr>
<th>Business</th>
<th>Amount</th>
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<tbody>
<tr>
<td>Classic Hair</td>
<td>$25.00</td>
</tr>
<tr>
<td>Pinetree Garage</td>
<td>$50.00</td>
</tr>
<tr>
<td>Robinson's Transmission</td>
<td>$50.00</td>
</tr>
<tr>
<td>Standish Hannaford</td>
<td>$25.00</td>
</tr>
<tr>
<td>Napa Auto Parts</td>
<td>$35.00</td>
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<tr>
<td>Joshua Scott in Memory of Angie Sudith</td>
<td>$100.00</td>
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- The High School is moving forward in a welding course with a dual enrollment through Kennebec Valley Community College. The Board will learn more about the project as the budget process progresses. On Thursday, Mr. Penna will be presenting equipment costs to the Budget Advisory Committee.

  Mr. Penna and Principal Lori Napolitano will be meeting with other high school principals, superintendents, and the Director of Westbrook Regional Vocational Center to discuss pathway processes for vocational students. The area of concern is in helping students to meet core requirements. The idea is to remove the obstacle by making it a part of vocational education.

- Mr. Penna reported that regionalization was continuing to move forward with the state proposing the Part II of the application process be due on June 30. If the application deadline is not met, there could be the potential to lose the regionalization efficiency assistance of $79,584.34 in the 2018 EPS. There is a meeting set for next week with facilitators and Maine Department of Education Commissioner Robert Hasson, Jr. that will provide more details. The District is in a position to move forward with one other school system. Mr. Penna asked the Board to review the PowerPoint presentation that he shared via email earlier in the week.

- Mr. Penna reported that due to the school cancellation on March 14, Bonny Eagle students were unable to attend the events planned for the day. He stated that students had planned nothing further as of this evening’s report. There was some discussion about a “Walk Up Day” where students would connect with other students that they did not know.

- Mr. Penna indicated that school security continued to be on the forefront of the administrators’ work. He stated that the District Emergency Planning Committee would be meeting on Tuesday, and the Committee would be discussing facility concerns versus code requirements. Also on the agenda will be a discussion on improvements that building administrators have currently made to building security. Mr. Penna noted that the High School now has one-way tape over the entrances at both ends of the building, and administration is considering expanding this inexpensive approach.

  Mr. Penna also reported that parent forums have been scheduled in order for administration to gain feedback on security/safety issues and procedures, particularly the student dismissal process.

- Mr. Penna has written a letter to Dr. Hasson, Commissioner of Education, to have him consider waiving four days in the school calendar for our high
 school seniors. Mr. Penna stated that if there was no opposition from the Board, he would mail the letter.

**Discussion:**

- *When we get another snow event, how will we handle that?*
  We have to handle this in a sequential manner. Mr. Penna would like to wait for the Commissioner’s response to his request first. If necessary, however, he may have to make alternate plans. The planning would include speaking with bargaining associations to see what they would be willing to do as well as communicating with students and parents.

- Mr. Harmon added that there were two steps in revising a school calendar: Board approval and approval of the Commissioner.

• Mr. Penna reported that the University of Maine, Farmington’s, Career Fair for Aspiring Teachers was held today. A team (Mr. Penna, Ms. Barschdorf, Ms. O’Donnell, Mr. Gleason, Mr. Harris, and Ms. Napolitano) from the District attended and found it very successful.

12. Mr. Dube provided the Policy Committee Report of March 5, 2018. Policy Code EEAEAA-R was reviewed and the Transportation Manager was in attendance to recommend a couple of changes to the current policy. The changes were recommended due to revisions in the law. Because this is an administrative procedure, it requires no action by the full Board, but it has been placed in the Board packet as an FYI. The Committee reviewed Policy Code ECB but recommended no change. With regard to Policy Code BDE, the Committee revisited the makeup of the Board standing committees. With the reapportionment of the Board, the Committee recommended changes to the number of Board members required on each of the standing committees. Other policies reviewed that contained no substantive changes were Policy Codes BDE-R, JIH, and JIH-R. They will be presented to the Board as FYIs.


14. **Moved by Mr. Paveur; seconded by Mr. Deakin:**

**VOTED:** “Yes,” Unanimously

15. Ms. Meserve presented the Negotiations Committee report of March 7, 2018. The Committee listened to and took action on a Level 3 grievance. It also reviewed a proposed job description for School Social Worker.

16. **Moved by Ms. Bowley; seconded by Mr. Deakin:**
To approve the job description for School Social Worker as presented.

**VOTED:** “Yes,” Unanimously
17. Mr. Harmon announced the upcoming Board of Directors’ meetings and workshops as follows:

**Thursday, March 22, 2018 (Central Office)**
~ Budget Advisory Committee Meeting – 6:00 PM – Conference Room

**Monday, April 2, 2018 (Central Office)**
~ Policy Committee Meeting – 4:30 PM – Library
~ Regular Board Meeting – 6:00 PM – Conference Room **(TELEVISIONED)**

All Board and MSAD 6 meetings may be viewed on the District’s website at: https://www.bonnyeagle.org/Page/10

18. **Moved by Mr. Deakin; seconded by Mr. Paveur:**
To adjourn the meeting at 7:43 p.m.

**VOTED:** “Yes,” Unanimously
6 more minutes: Struggling readers, reading practice, and growth

January 17, 2018

This post is the first entry in the *Education Leader’s Guide to Reading Growth*, a 7-part series about how education leaders can use research-driven strategies to support reading growth and achievement—and improve student outcomes.

What are the differences between a student who starts and ends the school year as a struggling reader, and a student who starts out struggling but ends the year succeeding?

A recent study comparing the two groups noted several differences in their reading practice characteristics, and one of them was the time spent reading per day. Students in the latter group—the “successful” readers—read approximately six minutes more per day on average.

In the world’s largest study of the reading habits of K–12 students—encompassing nearly 9.9 million students in more than 30,000 schools across the United States over the 2015–2016 school year—the authors also found differences in average words read (successful readers read more words) and quality of the reading practice as measured by the average comprehension level (successful readers had higher comprehension).¹

The study first looked at third-grade students who began the school year in the bottom quarter of reading achievement—struggling readers who would typically be identified as needing “intervention” or even “urgent
On average, the third graders who failed to meet grade-level benchmarks by the end of the year had 14.6 minutes of engaged reading time per day. In comparison, the third graders who met the college- and career-readiness benchmarks for their grade read for 20.0 minutes—a difference of less than 6 minutes of daily reading time. On average, these students also read 100,448 more words and had 11% higher comprehension than their peers who did not meet benchmarks.

The study next looked at sixth-grade students. Sixth graders who started the year in the bottom quarter and ended the year below benchmark read an average of 12.4 minutes per day. Sixth graders who started in the same place but achieved college- and career-readiness benchmarks averaged 18.0 minutes of engaged reading time per day. Once again, the difference in daily reading time was less than 6 minutes. These students also read more words on average (230,422 more) and had higher average comprehension (9% higher).
### Struggling-to-successful readers have different reading practice characteristics

<table>
<thead>
<tr>
<th>Grade 3</th>
<th>Grade 6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kids who stayed low</td>
<td>Kids who met benchmarks</td>
</tr>
<tr>
<td>Average minutes reading per day</td>
<td></td>
</tr>
<tr>
<td>14.6 vs. 20.0</td>
<td>12.4 vs. 18.0</td>
</tr>
<tr>
<td>Average words read</td>
<td></td>
</tr>
<tr>
<td>53,125 vs. 153,573</td>
<td>175,009 vs. 405,431</td>
</tr>
<tr>
<td>Average comprehension level</td>
<td></td>
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<tr>
<td>70% vs. 81%</td>
<td>71% vs. 80%</td>
</tr>
</tbody>
</table>

All students shown began the school year in the bottom quarter of reading achievement. Kids who read more words, spent more time reading each day, and read with greater understanding pulled ahead to end the year meeting college- and career-readiness benchmarks for their grade.

It’s important to recognize that engaged reading time is not the same as time spent looking at a page. It’s calculated based on the text’s total word count and difficulty/complexity level as well as the child’s individual reading level and overall comprehension of the text. For example, reading the same page for an hour without understanding its meaning counts as zero minutes of engaged reading time. (More information about how engaged reading time is calculated can be found [here](https://www.renaissance.com/2018/01/17/blog-6-more-minutes-stru...um-email&utm_campaign=TL_CMP_05695&utm_content=DA_Daily_2_20_18).)

While the study did not examine other variables that can affect achievement—such as quality of instruction or socioeconomic status—the data show that students who struggle initially but then begin to dedicate significant time to reading with high understanding can experience accelerated growth during the school year. This implies that, in addition to the high-quality instruction and intensive support that we know are essential for struggling readers to learn reading skills, time to practice applying those skills is also important.
It also indicates that reading practice isn’t simply an effect of a student’s reading skills. While it’s true that students who read well tend to read more, the fact that students who started at the same skill level but ended the school year with very different outcomes after engaging in different amounts of reading practice suggests that high-quality reading practice could help make significant contributions to growth. In other words, reading practice can be a sign of stronger reading skills, but it can also help build stronger reading skills.

What makes this particular revelation—that a small increase in daily reading time may play a role in turning a struggling reader into a successful one—even more eye-opening is the long-term impact reading skills (or a lack of reading skills) can have in a student’s academic career.

**Struggling readers in third grade**

A longitudinal study of nearly 4,000 students found that children who read proficiently in third grade were **four times** more likely to graduate on time than peers who were not proficient in reading in third grade. In fact, nearly **one in six** students who did not read proficiently in third grade did not graduate high school by age 19.4

When looking at only those students who were far below proficient—students categorized as having “below basic” reading skills—the rate dropped even further, with almost **one in four** students failing to graduate on time. Among students who did read proficiently in third grade, only **one in twenty-five** had not graduated high school by age 19.
In a class of 25 third-grade kids...

<table>
<thead>
<tr>
<th>Proficient Readers</th>
<th>Basic Readers</th>
<th>Below-Basic Readers</th>
</tr>
</thead>
<tbody>
<tr>
<td>![Image]</td>
<td>![Image]</td>
<td>![Image]</td>
</tr>
<tr>
<td>4% did not graduate</td>
<td>9% did not graduate</td>
<td>23% did not graduate</td>
</tr>
</tbody>
</table>

Among students who read proficiently in third grade, only one in twenty-five (4%) had not graduated high school by age 19.

Among students who had "basic" (not proficient) reading skills in third grade, 9% did not graduate high school by age 19.

Among students who had "below basic" (not proficient) reading skills in third grade, 23% did not graduate high school by age 19.

Another longitudinal study, this time of 26,000 students, found that less than 20% of students who were in the bottom quarter of reading achievement (0–24th national percentile) in third grade went on to attend college. At the other end of the scale, nearly 60% of the students who were in the top quarter of reading achievement (75th–100th national percentile) enrolled in college.5

In other words, the strongest readers—students who were in the top quarter of reading achievement in third grade—were nearly three times more likely to enroll in college than peers who struggled with reading and were in the bottom quarter of reading achievement.

Considering the numbers, the question must then be asked: Could a few additional minutes of engaged reading practice each day, combined with high-quality instruction and other supports, help a struggling third-grade student get on a trajectory toward high school graduation and college enrollment?
Strong reading skills in third grade

more likely to graduate high school
more likely to enroll in college

Struggling readers in sixth grade

If elementary reading performance has a role in high school graduation rates, then middle-school reading performance is even more critical. A longitudinal study of almost 13,000 students found that only 12% of students who failed an English course in sixth grade graduated high school on time. Another 6% graduated late. The remaining 82% did not graduate by the time the study had ended.⁶
It should be noted that sixth grade is part of a period during which reading gains experience the biggest decline. Over the course of a student’s education, yearly reading gains typically decrease as they move through the grades—which is the normal pattern for cognitive development and not a cause for concern. Students often see very large reading gains in early years; the difference between a student’s reading skills in second grade and third grade is much greater than the difference between skills in tenth and eleventh grades. However, the rate at which reading gains slow is not steady across all years—and sixth grade is part of a period during which that rate is lowest.
If you chart typical midyear Lexile® reader measure ranges (25th percentile to 75th percentile) across multiple grades, you’ll end up with a curve that starts fairly steep and softens as the years go by. Viewing the data this way, it’s easy to see that there is room for improvement, but it’s hard to see why we would look more closely at any grade range in particular.

### Typical midyear Lexile reader measures

However, if you look at only the changes in typical Lexile reader measure ranges across the years, a different pattern emerges. Here we do not see a steady decline across the years, but instead a **steep drop at the fifth and sixth grades**.

For most grades, the increase in both the upper and lower boundaries is 80% to 100% of the prior year’s increase. From tenth to eleventh grade, the upper boundary increases by 40L, which is 80% of the increase between ninth and...
tenth grade (50L), which is turn is 91% of the increase between eighth and ninth grade (55L)—and that is 92% of the increase between seventh and eighth grade (60L). However, between fourth and fifth grade the increase drops to 61% for the lower boundary and 68% for the upper boundary, and between fifth and sixth grade the increase drops to 63% for the lower boundary and 65% for the upper boundary.

Lexile (reading) gains represented as percentage of prior years’ gains

It is at sixth grade that students stop independently reading books within the text complexity bands for their grade. Between second and fifth grades, the vast majority of students read at least one book in their target grade band. In
sixth grade, that number plummets below 20% and never really recovers. From sixth grade through high school, less than 15% of students, on average, read one or more books in their target range.  

Students stop reading books within their text complexity grade bands in sixth grade

![Graph showing students reading in grade bands by grade.]

It is tempting to imagine what might happen if we were able to reverse these trends. If a few additional minutes of daily reading practice may help struggling readers transform into successful readers, could this also help change these students' entire academic trajectories? What if adding a few minutes of high-quality reading activities in our elementary classrooms reduced the total number of struggling readers in middle school? Could those minutes keep them reading within their text complexity grade bands, not just in sixth grade but in future grades?

**What if we made a few additional minutes of daily reading practice a reality for all struggling readers, in all grades?**

Let us be clear: We are not saying that six minutes of reading time is all you need to turn struggling readers into successful readers. We are saying that, if
you have struggling readers in your schools, or if you have ever been concerned about your students’ reading achievement levels or graduation rates, reading practice must be one of your top priorities.

However, it’s not just struggling readers who aren’t getting enough reading practice. In the next entry, we examine the relationship between reading practice and growth and show why increasing reading practice for all students needs to be a system-wide priority.

To read the next post in this series, click the banner below.

The magic of 15 minutes: Reading practice and reading growth

References

4 Hernandez, D. J. (2012). Double jeopardy: How third-grade reading skills


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A Look At Using 3D Pens In The Classroom - Guest Post from Martha Slack - EdTechTeacher

This guest post from Martha Slack (@slackmartha) first appeared on Edudemic.

The recent 3D printing explosion on the educational market has left many educators wondering how they can afford to integrate this technology into the classroom. Most schools do not have the luxury of purchasing a 3D printer but still want to provide the experience for their students. 3D pens made their debut on Kickstarter this year as an affordable 3D printing option. After the initial investment of the pens, they are an incredibly affordable tool for classrooms. The pens allow students to illustrate – in 3D – concepts in math, history, art, design, and chemistry, giving them a tangible means to explore complex ideas.

The pens work as a manual operating 3D printer. Heated filament is extruded through the pen’s tip, which quickly cools down to form a stable 3D structure. It actually adopts the same FDM technology which powers mainstream desktop 3D printers. The human ergonomic design allows students to draw an infinite variety of shapes and items, on both the 2D plane and within 3D free space.
Math: With the use of a 3D pen, geometry student can draw geometric designs and then construct their own forms.

Architectural/Historical Drawings: When researching important historical monuments, students can recreate the structures for presentations. Creating architectural drawings also incorporates mathematical skills – geometry, spatial orientation and measurement.

Sculptures and 3D Drawings: Teachers often ask students to create artistic, visual representations for projects. 3D pens can be an exciting artistic medium for any type of classroom. Art classes can use these pens to teach contour line, gesture drawing, expressive line, and a variety of sculptural
techniques. Instead of folding paper for origami, students can trace geometric shapes and construct the origami design.

![Image Credit: Martha Slack](image_url)

**Product Design:** Students can make jewelry by tracing 2D designs or drawing directly into the air. Earrings, necklaces and decorative pieces for headbands have all been created in my classroom.

**Science:** I was recently in a chemistry room and saw mobiles of atomic molecules hanging from the ceiling. When I saw these projects, I immediately thought about 3D pens. Students could use the 3D pens to create thematic classroom displays that are light-weight and easily hung from the ceiling.

I have seen the most disinterested and disengaged students come alive with the opportunity to try new technology. They are often bored with traditional
classroom materials and are desperate for cutting-edge mediums and tools that they see on the internet. The modern technology of 3D pens integrates and blends math, science and art in a user-friendly, efficient and visually appealing way. We have been testing the easy-to-use 3D pen from Dim3Printing for various projects, and my students love them! They will be available on Kickstarter this summer.

**My list of ways to incorporate 3D Pens in the classroom:**

- Perfect addition to any makerspace or 3D printing classroom
- A tool for creating models and prototypes for atoms/ molecules and other scientific projects
- Teaching basic geometric concepts through shape and form construction
- Problem solving and critical thinking exercises
- Teaching balance, gravity, and other concepts in physics
- Prototype and product design entrepreneurial assignments
- A creative medium for choice-based projects
- Great for teaching expressive line with contour and cross contour drawings
- Geometric sculptures
- Architectural drawings
- Mixed media art work
- Jewelry making
- A great medium for transitioning from 2D to 3D
- Creative tool for all sculpture-based art rooms
- Experimental and thematic projects
- Affordable replacement for wire sculptures

**Martha Slack** (@slackmartha) will be presenting *3D Printing in Your Classroom* at the July 28-30 EdTechTeacher Summit. Registration is still open! Come meet her in person.
Related

How (And Why) To Get Started With 3D Printing In The Classroom - Guest post from ETT Summit Presenter, Martha Slack
May 16, 2014
In "EdTechTeacher News"

Weekly Resources to Wrap Up May
May 17, 2014
In "Beth Holland"

Weekly Resources for Summer Learning
EdTechTeacher News What do Texas, California, Louisiana, Massachusetts, Illinois, Iowa, and Ontario have in common?

We had workshops or presentations in all of them this week! Shawn McCusker and Greg Kulowiec continued our Summer Workshop Series in Chicago with The iPad Classroom. Then Tom Daccord led Teaching History with Technology at the end of the week, and Samantha Morra led The Flipped Classroom & Innovative Instruction. Next...

June 21, 2014

In "Weekly Resources"
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