# Delaware Performance Evaluation Systems

- September 2019

## An Evaluation of DPAS-II and Alternative Evaluation Systems





## **Executive Summary**

#### **Overview**

Research has demonstrated that some teachers are dramatically more effective than others, and further, that these differences influence rates of student learning. Accordingly, over the last several decades, shifts in policy have resulted in the development and refinement of new teacher appraisal systems across the country. Delaware has been at the forefront of this movement, revising its system in 2000 through Senate Bill 260 and then again in 2010 through Senate Bill 263. In 2013, the Delaware Department of Education (DDOE) also began approving alternative evaluation systems that could be tailored to specific school - and district - contexts. The performance evaluation process has been driven by three overarching goals:

- ▶ **Evaluation Goal 1:** Foster professional growth by providing educators with actionable feedback and opportunities to improve and refine their teaching and support their students' growth;
- **Evaluation Goal 2:** Ensure that there are quality educators in every school building and classroom;
- ▶ **Evaluation Goal 3:** Continue to help students grow and succeed through targeted interventions and individualized educator professional development opportunities.

To understand educators' perceptions of DPAS-II, the Delaware Department of Education (DDOE) has engaged independent organizations to evaluate the system since 2007. Each of these evaluations has included a statewide survey administered to all teachers, specialists, and administrators in the state to document their views of the performance appraisal process. ImpactED at the University of Pennsylvania served as the external evaluator for the DDOE in the 2018-2019 school year.

This report begins by investigating educators' overall perceptions of DPAS-II and how those perceptions have changed over time. Then it explores how the following characteristics have influenced educators' perceptions of the evaluation system.

- ▶ **Perceptions of Design.** This section explores educators' feedback on key elements of the design of DPAS-II, such as the evaluation criteria, rubrics, and processes.
- ▶ **Perceptions of Implementation**. This section reports on educators' perceptions of the fidelity and quality of DPAS-II implementation.
- ▶ Perceptions of Professional Development & Resources. This section identifies educators' perceptions of the alignment and usefulness of professional development and resources associated with DPAS-II.

In addition, this report examines educators' perceptions of alternative evaluation systems (AES) on the same dimensions of design, implementation, and professional development.

<sup>&</sup>lt;sup>1</sup>Rivkin, S. G., Hanushek, E. A., & Kain, J. F. (2005). Teachers, schools, and academic achievement. *Econometrica*, 73, 417–458; Rockoff, J. E. (2004). The impact of individual teachers on student achievement: Evidence from Panel Data. *American Economic Review*, 94, 247–252.

Overall, this evaluation reveals that while average perceptions of the appraisal process have improved slightly over the past few years, educators' perspectives on the purpose and value of the system vary. This report draws on educators' opinions to offer recommendations for improving DPAS-II in the future.

## Methodology

The 2018-2019 DPAS-II and AES Biannual Survey was designed to capture educators' perceptions of the appraisal process. It included questions for all educators, as well as a series of questions designed only for evaluators. ImpactED distributed the survey between April 17, 2019, and May 31, 2019, via email to all 10,585 educators (administrators, teachers, and specialists) across the state of Delaware. Over 5,015 educators completed the survey, representing educators from every district and charter school, for a response rate of 47 percent. The data were weighted to represent the target population of 10,585 (the total number of educators who were invited to take the survey) and their distribution within that population by educator role (administrator, teacher, specialist) and school district.

## **Key Findings**

#### **DPAS-II**

#### **Overall Perceptions**

- ▶ In 2019, educators most commonly awarded DPAS-II a letter grade of C.
- ► Educators in 2019 were less positive about DPAS-II than they were in 2010, the first year they were asked to rate the system with a letter grade.
- ► Educators' perceptions stabilized between 2014 and 2017, and improved slightly from 2017 to 2019.
- Less than half of educators reported that DPAS-II is highly fair and equitable; however, perceptions of fairness were higher among administrators.
- Educators' perceptions of the fairness of DPAS-II are highly correlated with the overall grade of the system.
- Most educators did not believe that DPAS-II achieved all three stated goals of the evaluation system.
- Educators more commonly reported that DPAS-II is focused on compliance rather than instructional improvement.
- Educators who believe DPAS-II is focused on instructional improvement are more likely to perceive the system as fair and give it a higher letter grade rating.

#### **Perceptions of Design**

- Most educators reported that they understand how they are evaluated under DPAS-II as well as the measures that are being used to evaluate their performance.
- Educators reported that Components II and III are better measures of performance and more likely to drive student learning than other components.
- Educators reported that reducing the amount of paperwork and improving the observational rubrics (e.g., number of components, criteria) would be the best improvements to the system.

#### Perceptions of Implementation

- Most educators reported that DPAS-II had been implemented with fidelity and they were satisfied with the quality of implementation; however, evaluators were less satisfied with the implementation process.
- Educators' satisfaction with the implementation process is more related to their overall perceptions than whether the system is being implemented with fidelity.
- Most experienced teachers reported that they wanted to be observed more than once a year and that observations were conducted at an appropriate frequency.
- Most educators reported receiving specific feedback, but fewer reported that this feedback was actionable.
- Educators who received specific and actionable feedback were more likely to have positive perceptions of DPAS-II.

#### Perceptions of Professional Development

- Educators most often reported that district professional development was only sometimes aligned with DPAS-II and only sometimes related to areas of growth identified by their evaluators.
- Evaluators reported that they aren't getting the support they need to implement DPAS-II
  effectively.
- Just over half of teachers reported that they understand the Common Core State Standards (CCSS) and feel confident in their ability to design grade-appropriate assignments.
- Administrators were more aware of DPAS-II resources than teachers.
- Most teachers and administrators indicated that the resources they have used are useful.

#### **Alternative Evaluation Systems (AES)**

#### **Overall Perceptions**

- Educators at AES schools most commonly awarded their systems a B letter grade.
- Most educators at AES schools reported that their evaluation systems are highly fair and equitable.
- Teachers at AES schools reported that their evaluation systems are equally focused on compliance and instructional improvement.
- Most experienced teachers at AES schools reported that observations are conducted at the appropriate frequency.<sup>2</sup>
- Most educators at AES schools reported that the feedback they receive from their evaluators is specific and actionable, but fewer reported that they frequently receive the support necessary to make recommended changes.

#### Recommendations

#### For Districts

- Communicate that the primary purpose of the evaluation system is instructional improvement.
- Align professional development to DPAS-II and explicitly differentiate it based on educator needs.
- Offer additional training for evaluators on DPAS-II implementation, with a focus on providing actionable feedback.

#### For DDOE

- Revise DPAS-II rubric to reduce components.
- Increase communication about available DPAS-II resources.
- Involve teachers in the process of redesigning the system.

#### For Future Research

- Explore what is leading to differences between AES and DPAS-II.
- Conduct mixed methods research to better understand how specific teacher and school characteristics affect perceptions.
- Consider altering the survey design to increase the response rate.

<sup>&</sup>lt;sup>2</sup> AES observation frequency is greater than DPAS-II, averaging three, but ranging up to eight observations per year.

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#### Introduction

Research has demonstrated that some teachers are dramatically more effective than others, and further, that these differences influence rates of student learning. Accordingly, over the last several decades, shifts in policy have resulted in the development and refinement of new teacher appraisal systems across the country. The fundamental aim of these new systems is to provide a mechanism for ensuring quality educators in every classroom, while simultaneously fostering educators' professional growth.

Though they vary considerably, most of the systems developed over the last decade share a few core features. First, they use multiple measures to capture teachers' performance - typically a robust observation framework and a student growth or value-added model. They are accompanied by comprehensive implementation processes designed to provide timely and detailed feedback to educators. Additionally, states and districts offer aligned professional development and resources to support the implementation of these evaluation systems.<sup>3</sup>

#### **Delaware Evaluation System Overview**

Delaware has been at the forefront of this movement, developing and refining its educator appraisal process over the last several decades. The Delaware Performance Appraisal System (DPAS) was first adopted in 1987 and in 2000, the system was revised under Senate Bill 260 to require the implementation of DPAS-II across all districts in the state. DPAS-II was based on The Framework for Teaching developed by Charlotte Danielson, which has been used nationally to document and enhance teachers' practice. Originally developed in 1996, the Danielson Framework consists of four broad domains - Planning and Preparation, Classroom Environment, Instruction, and Professional Responsibilities - further divided into 22 components and a rubric that differentiates between four levels of performance.<sup>4</sup>

In 2010, Senate Bill 263 added a fifth component to educators' evaluation, the Student Improvement Component. The specific Student Improvement Component measures vary depending on the educator group, but include Measures A and B assessments, as well as Measure C growth goals. Measure A uses student scores from the state assessment in ELA and Math, and growth targets are based on the state's student growth model and are established by the Department of Education. The Student Improvement component took several years to refine and was not fully implemented until the 2012-2013 school year.

Table 1 provides an overview of the five components of educators' practice for teachers, specialists, and administrators in the current DPAS-II system.

<sup>&</sup>lt;sup>3</sup> National Council on Teacher Quality. (2017). Running in place: How new teacher evaluations fail to live up to promises. Retrieved from <a href="https://www.nctq.org/dmsView/Final">https://www.nctq.org/dmsView/Final</a> Evaluation Paper

<sup>&</sup>lt;sup>4</sup> Danielson, C. (2007). Enhancing professional practice: A framework for teaching. (2nd ed.). Alexandria, VA: ASCD.

Table 1. DPAS-II Components for teachers, specialists, and administrators

	Teachers	Specialists	Administrators
Component I	Planning and Preparation	Planning and Preparation	Vision and Goals
Component II	Classroom Environment	Professional Practice and Delivery of Service	Teaching and Learning
Component III	Instruction	Professional Consultation and Collaboration	People, Systems, and Operations
Component IV	Professional Responsibilities	Professional Responsibilities	Professional Responsibilities
Component V	Student Improvement	Student Improvement	Student Improvement

Source: Delaware Department of Education, DPAS-II Guide (Revised) for Teachers, DPAS II Guide (Revised) for Specialists, and DPAS-II Guide for Administrators (Assistant Principals, Principals, and District Administrator).

In 2013, DDOE invited Local Education Agencies (LEAs) to submit alternative approaches to DPAS-II in order to allow for innovation and increased autonomy at the local level. In the first year, DDOE approved the evaluation models of four schools, all of which were charter schools. By the 2018-19 school year, two traditional districts and 11 charter schools had implemented alternative evaluation systems tailored to their particular context.

Throughout these policy iterations, the performance evaluation process in Delaware has been driven by three overarching goals:

- ▶ **Evaluation Goal 1:** Foster professional growth by providing educators with actionable feedback and opportunities to improve and refine their teaching and support their students' growth;
- **Evaluation Goal 2:** Ensure that there are quality educators in every school building and classroom;
- ▶ Evaluation Goal 3: Continue to help students grow and succeed through targeted interventions and individualized educator professional development opportunities.

To understand educators' perceptions of how well the system achieves these goals, the Delaware Department of Education (DDOE) has engaged independent organizations to evaluate DPAS-II since 2007. Each of these evaluations has included a statewide survey provided to all teachers, specialists, and administrators in the state to document their views of the performance appraisal process. ImpactED at the University of Pennsylvania served as the external evaluator for the DDOE in the 2018-2019 school year.

#### **Report Overview**

This report begins by investigating educators' overall perceptions of DPAS-II and how those perceptions have changed over time. Then it explores how the following characteristics have influenced educators' perceptions of the evaluation system.

- ▶ **Perceptions of Design.** This section explores educators' feedback on key elements of the design of DPAS-II, such as the evaluation criteria, rubrics, and processes.
- ▶ **Perceptions of Implementation**. This section reports on educators' perceptions of the fidelity and quality of DPAS-II implementation.
- ▶ Perceptions of Professional Development & Resources. This section identifies educators' perceptions of the alignment and usefulness of professional development and resources associated with DPAS-II.

In addition, this report examines educators' perceptions of alternative evaluation systems (AES) on the same dimensions of design, implementation, and professional development. Finally, the report closes by providing the Delaware Department of Education with key recommendations for continually improving the design of the evaluation system, as well as the professional development and resources to support quality implementation.

This report provides a high level overview of key findings. For more detail on the responses to each of the survey questions in the 2018-2019 DPAS-II and AES Biannual Survey, please refer to the Technical Appendix, which lists survey items by evaluation system type (DPAS-II or AES) and includes complete response data for each item.

## Methodology

### **Instrument Development**

The 2018-2019 DPAS-II and AES Biannual Survey was based on the survey created by Research for Action in 2017 and was collaboratively updated by researchers at ImpactED and administrators at the Delaware Department of Education. The instrument surveyed two distinct groups: (1) educators (i.e., teachers, specialists, and administrators) evaluated under DPAS-II during the 2018-19 school year and (2) educators evaluated under alternative evaluation systems (AES) during the 2018-19 school year. In addition, the survey also sought the perspectives of those who conducted evaluations through both systems during the 2018-2019 school year.

The survey consisted of five sections: general perceptions, implementation, professional development, summative perceptions, and a cross-dimensional section for evaluators only. The survey questions were multiple choice with the exception of one open-ended question. As part of the analysis, survey findings were organized into the sections noted above - i.e., system design, implementation, and professional development.

#### **Recruitment and Administration**

Between April 17, 2019 and May 31, 2019, ImpactED administered the online survey to 10,585 teachers, specialists, and administrators in Delaware. ImpactED sent the initial invitation and bi-weekly reminders throughout the entire administration period (twelve reminders total).

Each educator received a personalized email containing a unique link to the survey. This same link was included in all ensuing reminders, which ensured 1) that educators' progress would be automatically saved if they were interrupted and 2) that educators could take the survey only once. Every educator with an email address on file with DDOE received an invitation to participate in the survey.

#### The Sample

In total, 5,014 educators responded to the survey, which amounts to a 47 percent response rate. Table 2 documents the percentage of partial and full completions.

Table 2. 2019 DPAS-II and AES Biannual Survey sample and response rate

	Total
Total sample	10,585
Invalid Email Address	- 88
Total respondents	5014
Total partial completions	587
Total full completions	4427
Response rate	47%

Depending on their school or district, educators received questions about DPAS-II or their alternative evaluation system. As demonstrated in Table 3, among survey respondents, 82 percent were evaluated under DPAS-II and 18 percent were evaluated under alternative systems.

Table 3. Number and percentage of survey respondents, by evaluation system<sup>5</sup>

	DPAS-II	AES
Total number of educators	4108	891
Percent of educators	82%	18%

<sup>&</sup>lt;sup>5</sup> Note: when comparing respondent classification by evaluation system, 15 cases were missing.

The survey also asked educators to identify their role as teacher, specialist, or administrator. Across both evaluation systems, 76 percent of the respondents were teachers, 17 percent were specialists, and 6 percent of the respondents were administrators. (Table 4).

Table 4. Number and percentage of survey respondents, by educator role and evaluation system<sup>67</sup>

	DPAS-II		AES		Total	
	Number	Percent	Number	Percent	Number	Percent
Teachers	3111	76%	718	81%	3830	76%
Specialists	707	17%	166	19%	874	17%
Administrators	285	7%	7	1%	305	6%
Total	4103	100%	891	101%	5009	99%

ImpactED weighted the sample to match population parameters for role (administrator, teacher, specialist) and school district. Weighting is a tool generally used in survey analysis to correct for discrepancies between the survey respondents (the sample) and the target population. In this case, the target population, or the total number of educators who were invited to take the survey, was 10,585, and the total number of staff who completed the survey (the sample) was 5,014 (See Appendix A for Weighting Methodology Report).

## **Key Findings for DPAS-II**

#### **Overall Perceptions of DPAS-II**

To capture educators' overall perceptions of DPAS-II, the DDOE has been asking educators to assign DPAS-II a grade on a scale of A-F over the last ten years and in more recent years, to rate the system's overall fairness. Past research has indicated that educators' perceptions of fairness are influenced by the degree to which they believe the evaluation components are aligned to their day-to-day practices, as well as the accuracy and consistency of expectations.<sup>8</sup> It has also shown that educators are more likely to view the system as focused on compliance, as opposed to instructional improvement.<sup>9</sup>

In this analysis, we continue to investigate these trends over time. We also explore the extent to which educators' perceptions of the fairness and purpose of the evaluation system influence their overall grade.

<sup>&</sup>lt;sup>6</sup> Percentages may not sum to 100% due to rounding.

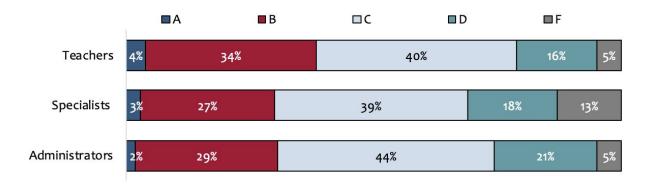
<sup>&</sup>lt;sup>7</sup> There were five respondents not classified by educator role, which is why the total is less than 5014.

<sup>&</sup>lt;sup>8</sup> Research For Action (2015). *Delaware Performance Appraisal System Second Edition (DPAS-II) Evaluation Report*. Retrieved from <a href="https://www.doe.k12.de.us/cms/lib/DE01922744/Centricity/Domain/375/RFA%20Evaluation%20of%20DPAS-II%2011.1.2">https://www.doe.k12.de.us/cms/lib/DE01922744/Centricity/Domain/375/RFA%20Evaluation%20of%20DPAS-II%2011.1.2</a> <a href="https://www.doe.k12.de.us/cms/lib/DE01922744/Centricity/Domain/375/RFA%20Evaluation%20of%20DPAS-II%2011.1.2">https://www.doe.k12.de.us/cms/lib/DE01922744/Centricity/Domain/375/RFA%20Evaluation%20of%20DPAS-II%2011.1.2</a>

<sup>&</sup>lt;sup>9</sup> Research For Action (2017). Delaware Performance Appraisal System Second Edition (DPAS-II): An Evaluation Report. Retrieved from <a href="https://www.doe.k12.de.us/cms/lib/DE01922744/Centricity/Domain/375/2017">https://www.doe.k12.de.us/cms/lib/DE01922744/Centricity/Domain/375/2017</a> An%20Evaluation%20Report%20of%20DP <a href="https://www.doe.us/cms/lib/DE01922744/Centricity/Domain/375/2017">https://www.doe.us/cms/lib/DE01922744/Centricity/Domain/375/2017</a> An%20Evaluation%20Report%20Of%20DP <a href="https://www.doe.us/cms/lib/DE01922744/">https://www.doe.us/cms/lib/DE01922744/</a> Centricity/Domain/375/2017</a> An%20Evaluation%20Report%20Of%20DP <a href="https://www.doe.us/cms/lib/De01922744/">https://www.doe.us/cms/lib/De01922744/</a> Centricity/Domain/375/2017</a> An%20Evaluation%20Report%20Of%20DP <a href="https://www.doe.us/cms/lib/De01922744/">https://www.doe.us/cms/lib/De01922744/</a> An%20Evaluation%20Report%20Of%20DP <a href="https://www.doe.us/cms/lib/De01922744/">https://www.doe.us/cms/lib/De01922744/</a> An%20Evaluation%20Report%20DP <a href="ht

▶ In 2019, educators most commonly awarded DPAS-II a letter grade of C. When asked what grade respondents would give DPAS-II, overall, 4 percent of educators awarded DPAS-II an A, 33 percent awarded a B, 40 percent awarded a C, 17 percent awarded a D, and 7 percent awarded DPAS-II an F.

Figure 1. Educators most often awarded DPAS-II a letter grade of C in 2019



- ▶ Educators in 2019 were less positive about DPAS-II than they were in 2010, the first year they were asked to rate the system with a letter grade. Thirty-eight percent of educators in 2019 graded DPAS-II as an A or B compared to 69 percent in 2010. However, DPAS-II has been revised multiple times over the nine-year period, most significantly as a result of the adoption and implementation of the Student Improvement Component during the 2012-13 school year. Thus, it must be noted that respondents in 2010 and 2019 were not rating the same version of DPAS-II.
- ▶ Educators' perceptions stabilized between 2014 and 2017, and improved slightly from 2017 to 2019. In the years following DDOE's implementation of the Student Improvement Component, educators' grades of DPAS-II stabilized and have begun to improve slightly. Though the most commonly-awarded grade remains a C, the percent of teachers and specialists awarding Bs has increased since 2017, and the percentage of those awarding Ds and Fs has decreased since 2017. Between 2017 and 2019, the percent of teachers and specialists grading DPAS-II as an A or B increased by 14 percentage points and 11 percentage points, respectively. Administrators' ratings have remained consistent.

Figure 2. Teachers' grades stabilized after a drop in 2013 and improved slightly in 2019

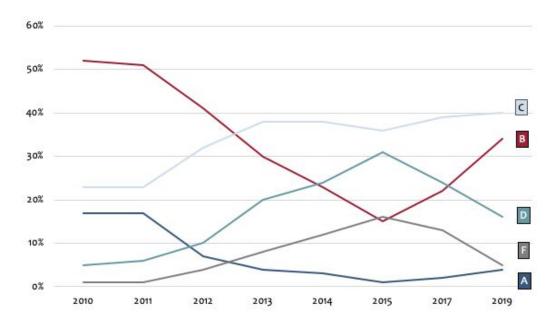
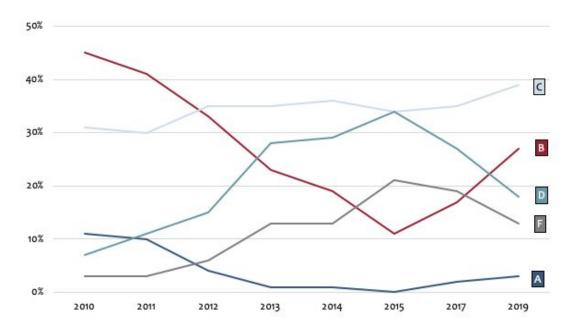


Figure 3. Specialists' grades stabilized after a drop in 2013 and improved slightly in 2019



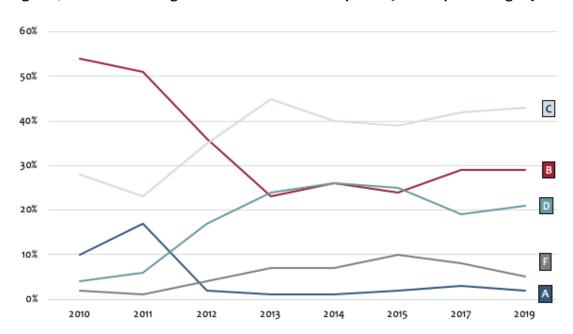
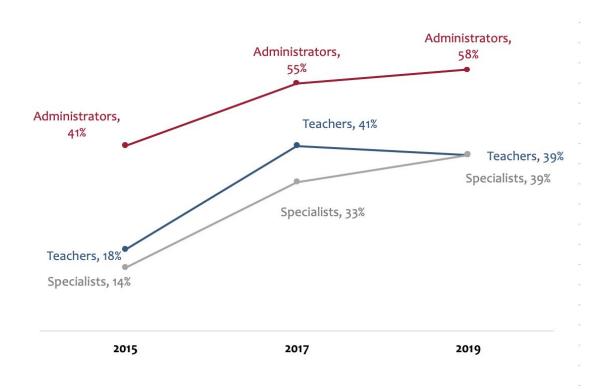


Figure 4. Administrators' grades stabilized after a drop in 2013 and improved slightly in 2019

Less than half of educators reported that DPAS-II is highly fair and equitable; however, perceptions of fairness were higher among administrators. Forty percent of educators reported that DPAS-II is highly fair and equitable (captured as "very" to "mostly" equitable), and 34 percent reported the system as "somewhat" fair. Thirteen percent were less positive, reporting that the system is only "a little" fair and equitable, while 12 percent reported that DPAS-II is "not fair and equitable at all."

Perceptions of fairness varied by role. More than half of administrators (58 percent) reported that DPAS-II is highly fair and equitable, compared to less than half of teachers and specialists (39 percent of each group). Across roles, perceptions of fairness increased considerably between 2015 and 2017 and then stabilized in 2019 for teachers and administrators. Specialists' perceptions continued to increase slightly in 2019 (see Figure 5).





- ▶ Educators' perceptions of the fairness of DPAS-II are highly correlated with the overall grade of the system. There is a strong positive correlation between educators' perceptions of fairness and the letter grade they award to DPAS-II.¹¹ Educators who reported believing that DPAS-II is fair and equitable were also more likely to rate the system positively. On average, those who reported that DPAS-II is "very fair and equitable" awarded the system a B, while those who reported that the system is "a little fair and equitable" or "not fair and equitable at all" tended to award Ds and Fs, respectively.
- ▶ Most educators did not believe that DPAS-II achieved all three stated goals of the evaluation system. The 2019 survey asked educators to report the extent to which they felt DPAS-II achieved the three stated goals of the evaluation system continuous improvement of student outcomes, educators' professional growth, and quality educators in every school building and classroom. Just under 30 percent of educators reported that DPAS-II was highly effective ("very" or "mostly" effective) in achieving each of the stated goals of the evaluation system. Teachers and administrators had more favorable perceptions than specialists, of whom fewer than 20 percent believed the system achieved each of its stated goals (see Figures 6 and 7).

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<sup>&</sup>lt;sup>10</sup> *r*=.67, *p*<.001

When viewed holistically, fewer than 20 percent of educators rated DPAS-II as highly effective in meeting all three stated goals of the evaluation system. The majority of educators (61 percent) reported that DPAS-II is not highly effective for any of the stated goals of evaluation systems.

Figure 6. Less than one third of educators reported that DPAS-II is highly effective in each goal

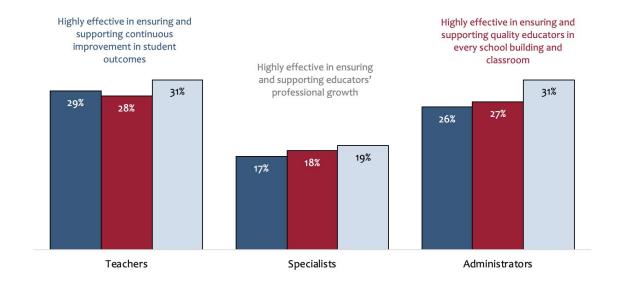
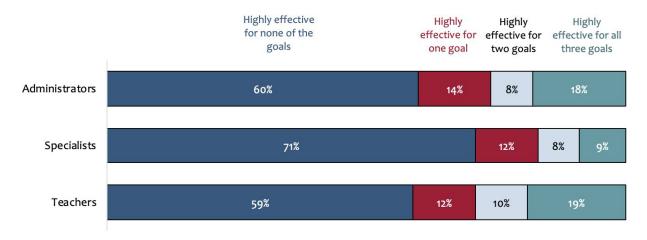


Figure 7. Most educators reported that DPAS-II is highly effective for none of the goals



▶ Educators more commonly reported that DPAS-II is focused on compliance rather than instructional improvement. Educators were asked to report on the extent to which DPAS-II is focused on compliance, as well as the extent to which the system is focused on instructional improvement. Overall, 64 percent of educators reported that DPAS-II is highly ("very" or "mostly") focused on compliance, compared to 44 percent who reported that DPAS-II is highly focused on instructional improvement.

Though educators in all roles were more likely to report that the system is focused on compliance, administrators were more likely than other educators to rate the system as highly focused on instructional improvement. Whereas more than half of administrators reported an improvement

focus, less than half of teachers and administrators (45 percent and 37 percent, respectively) held similar views. Administrators' views on this measure shifted slightly from 2017 to 2019; in 2017, less than half (43 percent) of administrators reported an improvement focus and in 2019, this percentage increased to 54 percent. Additionally, the percentage of administrators reporting a compliance focus decreased slightly, from 73 percent in 2017 to 68 percent in 2019.

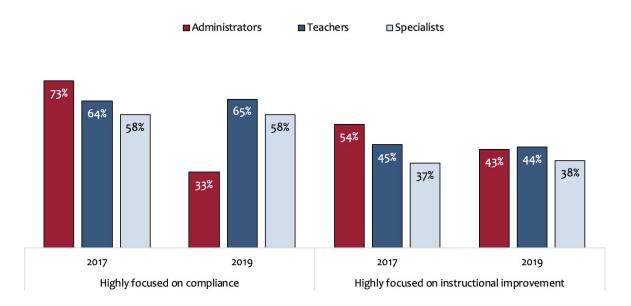


Figure 8. Educators more commonly reported that DPAS-II is focused on compliance

▶ Educators who believe DPAS-II is focused on instructional improvement are more likely to perceive the system as fair and give it a higher letter grade rating. The more that educators believe DPAS-II is focused on instructional improvement, the more likely they are to 1) believe that DPAS-II is fair and equitable and 2) award DPAS-II a higher letter grade. There is a strong positive correlation between educators' perception that the system is focused on instructional improvement and the letter grade¹¹ and a moderate positive correlation with perceptions of fairness.¹² Educators' perceptions that the system is focused on compliance are only slightly correlated with overall perceptions. In other words, educators who believe the system is focused on their improvement are significantly more likely to have positive perceptions.

### **Perceptions of Design**

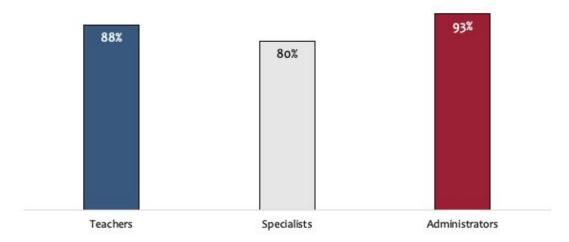
The DPAS-II system currently evaluates teachers' performance on five key components; the first four components are based on Charlotte Danielson's Framework for Teaching and the final component is based on student improvement. This section investigates educators' perceptions of the system's design and if their understanding of the measures contribute to their overall perceptions of DPAS-II. More specifically, the survey asked educators to rate which components of DPAS-II were the most effective in assessing performance and driving student achievement, as well as to rank possible changes to the system.

 $^{12}$  r = .38, p < .001

 $<sup>^{11}</sup>$  r = .48, p < .001

▶ Most educators reported that they understand how they are evaluated under DPAS-II as well as the measures that are being used to evaluate their performance. Eighty-seven percent of educators reported a high level of understanding ("mostly" or "completely understand") of how they are evaluated under DPAS-II. Their level of understanding is only slightly correlated with their perceptions of fairness.¹³ A smaller majority of educators reported understanding the measures used to evaluate their performance. Administrators as a group are most confident in their level of understanding; nearly 70 percent reported that they completely understand how they are evaluated.

Figure 9: Most educators reported a high level of understanding of how they are evaluated



▶ Educators reported that Components III and II are better measures of performance and more likely to drive student learning than other components. The survey asked educators to rank DPAS-II components according to their effectiveness in assessing educator performance. It also asked teachers to indicate which components are best able to drive student learning. Overall, most educators included Components III and II in their rankings of the top three components to assess their performance, though it is important to keep in mind that across educator types, Components I, II, and III differ (see Table 1).¹⁴

Both teachers and administrators were least likely to include Component IV (Professional Responsibilities) in their top three ranking (see Figure 10). Teachers were also most likely to report that these same components greatly ("a great deal" or "very much") drive student achievement gains.

<sup>14</sup> This report focuses only on Components I-IV.

 $<sup>^{13}</sup>$  r=.14, p<.001

Figure 10. Most teachers included Instruction [Component III] and Classroom Environment [Component II] in their rankings of the top three DPAS-II components to assess performance and their ratings of the components best able to drive student achievement gains

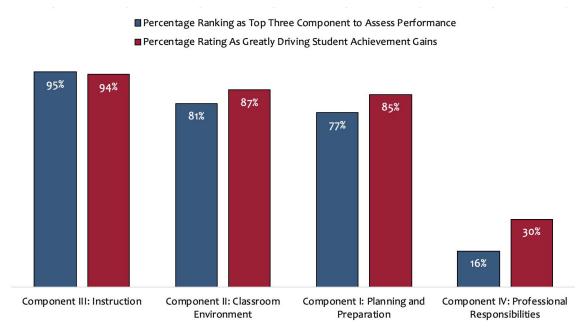
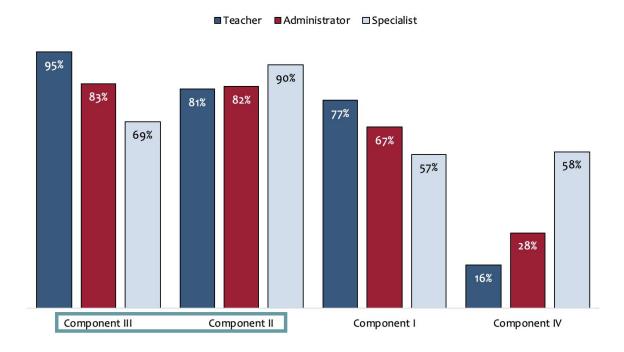


Figure 11. Most educators included Components III and II in their rankings of the most effective components for assessing performance<sup>15</sup>



<sup>&</sup>lt;sup>15</sup> Components I, II, and III differ across educator types. See Table 1 on pg. 6 for component descriptions by educator type.

▶ Educators reported that reducing the amount of paperwork and improving the observational rubrics (e.g., number of components, criteria) would be the best improvements to the system. Educators were asked to report on possible changes to improve DPAS-II and on average, proposed 2.4 changes to the system. Overall, most educators (67 percent) indicated that reducing paperwork would improve DPAS-II, and nearly half (49 percent) suggested that fewer components would be a positive change (see Table 5). Reducing the number of components, criteria, and revising the rubric all point to the need to improve the observational component of the system.

Table 5. Educator views of possible changes to improve DPAS-II

Possible Change	Teacher	Specialist	Administrator	Overall
Reduced paperwork	68%	65%	66%	67%
Reduced number of components (Components I-IV)	49%	49%	37%	49%
Reduced number of criteria	39%	36%	49%	39%
Revised Rubrics (Components I-IV)	37%	41%	42%	38%
Increased frequency of visits and feedback	18%	11%	26%	17%
Decreased time of full observation visit	17%	10%	19%	16%
Required annual summative for every educator	9%	10%	13%	9%
Average number of changes proposed	2.37	2.24	2.52	2.35

#### **Perceptions of Implementation**

The effectiveness of teacher evaluation systems ultimately depends on how well they are implemented in a particular context. On this year's survey, educators were asked if the evaluation system was being implemented with fidelity, as well as how satisfied they were with the implementation process. Additionally, the survey asked for educators' perceptions about the frequency of observations they received and the quality of the feedback following those observations. As described below, responses on these questions varied, suggesting that implementing the evaluation system as designed does not necessarily result in the desired outcomes.

▶ Most educators reported that DPAS-II had been implemented with fidelity and they were satisfied with the quality of implementation; however, evaluators were less satisfied with the implementation process. Ninety-three percent of educators reported that DPAS-II was being implemented with fidelity to a large or moderate extent at their school or district. Educators' overall level of satisfaction with implementation was also high, with 70 percent of educators reporting that

they were very or mostly satisfied with DPAS-II implementation. In contrast, evaluators were less satisfied with implementation; only 47 percent of evaluators said they were very or mostly satisfied with the implementation of DPAS-II at their school or district.

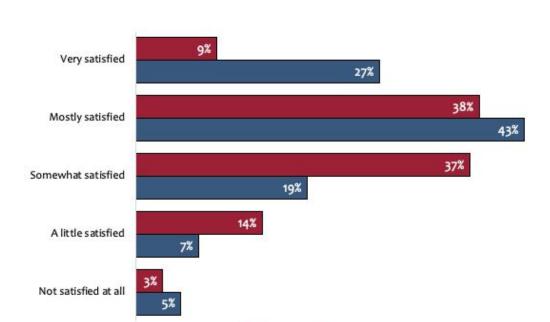


Figure 12. Educators were more satisfied with the implementation process than evaluators

▶ Educators' satisfaction with the implementation process is more related to their overall perceptions than whether the system is being implemented with fidelity. As noted above, most educators reported that DPAS-II was implemented with fidelity and that they were satisfied with the quality of implementation; however, rates of satisfaction were lower than reported fidelity. Additionally, as demonstrated in Figure 13, educators' satisfaction with implementation is more strongly associated with their overall perceptions of the systems' instructional improvement focus, <sup>16</sup> grade, <sup>17</sup> and fairness, <sup>18</sup> when compared to the relationship between fidelity of implementation and the systems' instructional improvement focus, <sup>19</sup> grade, <sup>20</sup> and fairness. <sup>21</sup> This analysis indicates that implementing the evaluation system with fidelity is only slightly related to educators' overall perceptions and that satisfaction with implementation is likely influenced by other factors.

■ Evaluators ■ Educators

 $<sup>^{16}</sup>$  r=.45, p<.001

 $<sup>^{17}</sup>$  r=.49, p<.001

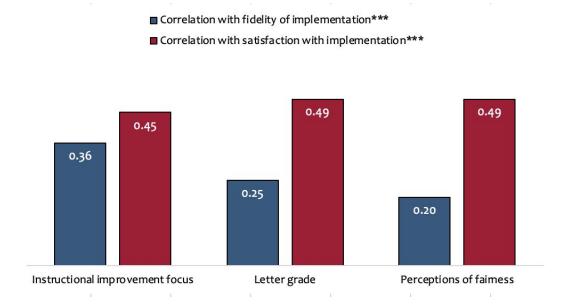
 $<sup>^{18}</sup>$  r=.49, p<.001

 $<sup>^{19}</sup>$  r=.36, p<.001

 $<sup>^{20}</sup>$  r=.25, p<.001

 $<sup>^{21}</sup>$  r=.20, p<.001

Figure 13. Educators' satisfaction with implementation is more related to overall perceptions than whether the system is being implemented with fidelity



▶ Most experienced teachers reported that they wanted to be observed more than once a year and that observations were conducted at an appropriate frequency. The survey asked experienced teachers (i.e., teachers with at least four years of experience) to indicate their preferences as far as the frequency and length of observations. Currently, DPAS-II requires one official observation annually for experienced teachers. However, most teachers (59 percent) indicated that they would ideally receive more than one observation per year as part of the evaluation process. In addition, 79 percent of teachers reported wanting feedback at least two to three times a year; one quarter of teachers reported wanting feedback at least monthly.

Figure 14. Most teachers reported wanting more than one observation as part of their evaluation

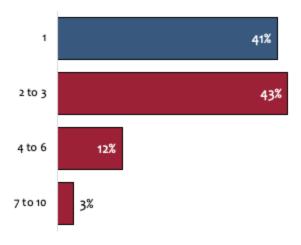
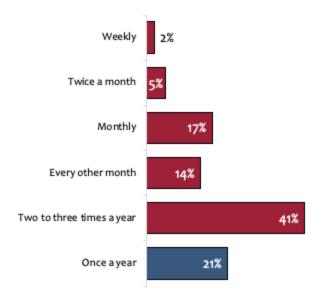


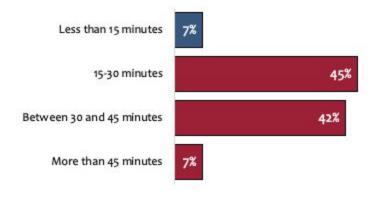
Figure 15. Most teachers reported wanting feedback at least two to three times per year



Interestingly, a large majority (83 percent) also reported that their evaluators conducted observations at an appropriate frequency, suggesting that educators may be receiving additional observations beyond what is officially required by the system.

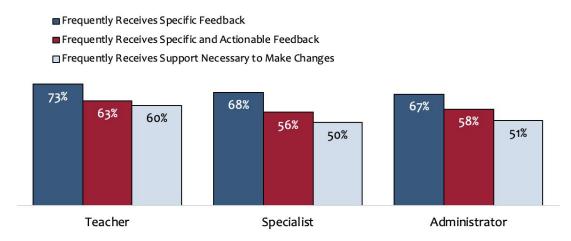
Educators' opinions about how long observations should last were relatively split. Forty-five percent of teachers reported wanting observations to last between 15 and 30 minutes, and 42 percent reported wanting slightly longer observations lasting between 30 and 45 minutes.

Figure 16. Most teachers reported that observations should last between 15 and 45 minutes



▶ Most educators reported receiving specific feedback, but fewer reported that this feedback was actionable. Nearly three-quarters of educators reported that they frequently ("often" or "all the time") received specific feedback. However, only 61% reported that this feedback was both specific and actionable and that they had the support necessary to make changes in their practice. As demonstrated in Figure 17 below, teachers were slightly more positive than specialists and administrators about the quality of feedback they received.

Figure 17. Most educators reported receiving specific feedback frequently, but fewer reported that feedback was actionable and supportive in changing professional practice.



▶ Educators who received specific and actionable feedback were more likely to have positive perceptions of DPAS-II. The quality of received feedback (i.e., whether feedback is specific and actionable) is correlated with educators' grades of DPAS-II,<sup>22</sup> their belief that DPAS-II is focused on instructional improvement,<sup>23</sup> and their belief that DPAS-II is fair and equitable.<sup>24</sup> Though the relationship between feedback and the belief that the system is focused on instructional improvement is strongest, all three relationships are significant, indicating that receiving clear and actionable feedback makes it more likely that educators will have positive perceptions of DPAS-II.

#### **Perceptions of Professional Development**

The DDOE and local districts both provide professional development and resources to support the implementation of DPAS-II. This analysis explored whether educators were aware of the available support and, if so, the extent to which they found it valuable in improving their practice. Additionally, the survey included several new questions to capture whether teachers understood and were confident in their ability to implement grade-appropriate assignments aligned with the Common Core Standards, which has been a major focus in the state over the last several years.

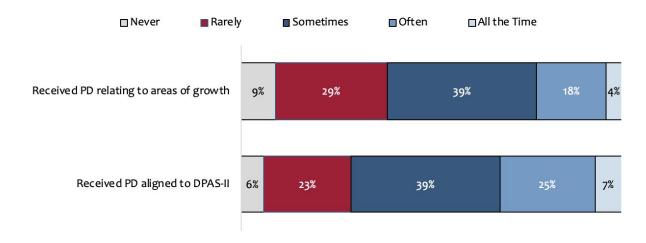
▶ Educators most often reported that district professional development was only sometimes aligned with DPAS-II and only sometimes related to areas of growth identified by their evaluators. About one third (32 percent) of educators reported that they frequently had access to professional development aligned to DPAS-II, and fewer (22 percent) reported frequently having access to professional development related to their specific areas for growth. As far as the actual frequency, most teachers reported that training on DPAS-II happens once a year or less.

 $<sup>^{22}</sup>$  r=.36, p<.001

 $<sup>^{23}</sup>$  r=.45, p<.001

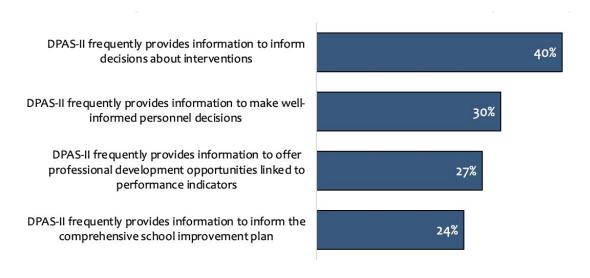
 $<sup>^{24}</sup>$  r=.32, p<.001

Figure 18. Educators reported that PD was only sometimes aligned to DPAS-II and related to areas of professional growth



effectively. The survey asked evaluators about the support they received to carry out their evaluative duties. Specifically, they were asked about whether the support provided information to make well-informed personnel decisions, offer high-quality professional development opportunities, inform comprehensive school improvement plans and decisions about interventions. Across all four measures, more than half of surveyed evaluators indicated that DPAS-II does not frequently ("often" or "all the time") provide information to carry out these duties (see Figure 19). Notably, less than a quarter (24 percent) reported that they frequently received information to inform comprehensive school improvement plans.

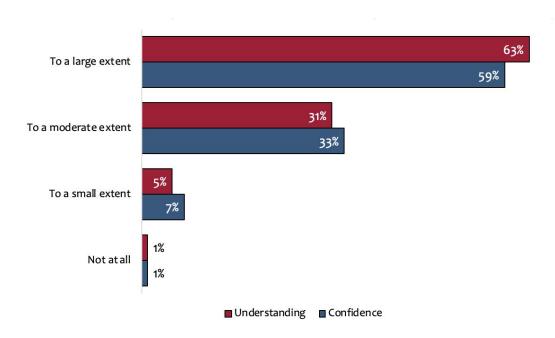
Figure 19. Most evaluators reported that DPAS-II does not frequently provide information to carry out evaluative duties



▶ Just over half of teachers reported that they understand the Common Core State
Standards (CCSS) and feel confident in their ability to design grade-appropriate
assignments. The survey asked teachers to report on the extent to which they understood the
Common Core State Standards (CCSS) or relevant standards in their field, as well as how confident
they were in their ability to design grade-appropriate assignments aligned to those standards. About
60 percent of teachers reported understanding CCSS to a large extent and having the confidence to
design CCSS-aligned assignments.

This finding is particularly interesting given recent research on the challenges associated with developing grade-appropriate assignments. Specifically, "The Opportunity Myth" followed students in five school districts and found that fewer than a fifth of assignments in studied classrooms met standards for college-readiness.<sup>25</sup> Even if a significant portion of teachers indicate understanding CCSS and feeling confident in their ability to design standards-aligned assignments, it is important to explore the extent to which teachers are able to provide students with access to rigorous assignments.

Figure 20. Just over half of teachers reported understanding CCSS and feeling confident in their ability to design CCSS-aligned assignments

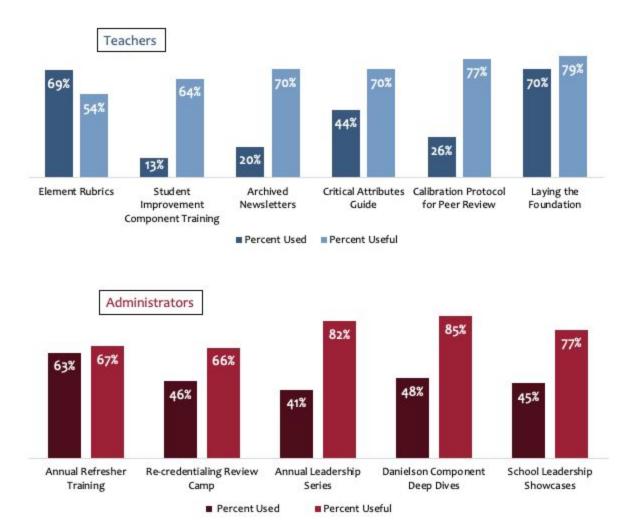


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<sup>&</sup>lt;sup>25</sup> TNTP (2018). The Opportunity Myth: What Students Can Show Us about How School Is Letting Them Down -- And How to Fix It. Retrieved from <a href="https://opportunitymyth.tntp.org/">https://opportunitymyth.tntp.org/</a>

- Administrators were more aware of DPAS-II resources than teachers. On average, 64 percent of administrators reported that they were aware of DPAS-II resources available through DDOE, compared to only 20 percent of teachers. Administrators reported being most aware of the Annual Refresher Training (93 percent) and the Recredentialing Review Camp (83 percent). Out of all resources, teachers were most aware of Element Rubrics (45 percent).
- Most teachers and administrators indicated that the resources they have used are useful. Though levels of awareness varied, most administrators and teachers who had used the available resources indicated that they were useful (See Figure 21). More than half of teachers who had accessed the resource rated each available resource as useful; the highest-rated resource for teachers was the Calibration Protocol for Peer Review. Administrators were even more positive, with more than 65 percent of administrators who had accessed the resource rating each available resource as useful; the highest-rated resource for administrators was the "Danielson Component Deep Dives."

Figure 21. Most teachers and administrators who used resources reported that they were useful.



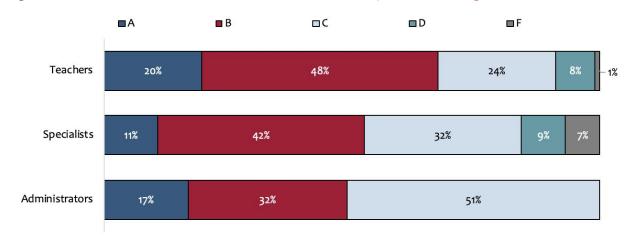
## **Key Findings for Alternative Evaluation Systems (AES)**

#### **Overall Perceptions of AES**

This section will explore educators' overall perceptions of alternative evaluation systems (AES), as well as perceptions of design, implementation, and professional development across AES systems. To capture educators' overall perceptions of their AES, the DDOE asked educators to assign a grade on a scale of A-F and to rate the overall fairness of their systems. Past research has indicated that educators' perceptions of fairness are influenced by the degree to which they believe the evaluation components are aligned to their day-to-day practices, as well as the accuracy and consistency of expectations. It has also shown that educators are more likely to view the system as focused on compliance, as opposed to instructional improvement.

Educators at AES schools most commonly awarded their systems a B letter grade. When asked what grade respondents would give their evaluation systems, overall, 18 percent of educators evaluated by AES systems awarded their systems an A, 46 percent awarded a B, 26 percent awarded a C, 8 percent awarded a D, and 2 percent awarded their systems an F. Teachers were more positive than both specialists and administrators. However, no administrators provided their evaluation systems with grades lower than a C.

Figure 22. Educators most often awarded their evaluation systems a letter grade of B in 2019



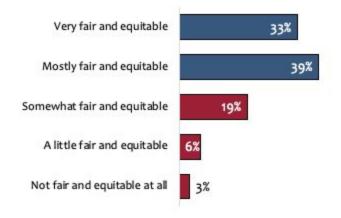
• Most educators at AES schools reported that their evaluation systems are highly fair and equitable. Nearly three fourths (72 percent) of educators reported that their evaluation systems were highly ("very" to "mostly") fair and equitable. Nineteen percent reported that the system was "somewhat" fair and equitable, 6 percent reported that they were "a little" fair and equitable, and only 3 percent reported that they were "not fair and equitable at all." In addition, educators' grades

<sup>&</sup>lt;sup>26</sup> Research For Action (2015). *Delaware Performance Appraisal System Second Edition (DPAS-II) Evaluation Report.* Retrieved from <a href="https://www.doe.k12.de.us/cms/lib/DE01922744/Centricity/Domain/375/RFA%20Evaluation%20of%20DPAS-II%2011.1.2">https://www.doe.k12.de.us/cms/lib/DE01922744/Centricity/Domain/375/RFA%20Evaluation%20of%20DPAS-II%2011.1.2</a> <a href="https://www.doe.k12.de.us/cms/lib/DE01922744/Centricity/Domain/375/RFA%20Evaluation%20of%20DPAS-II%2011.1.2">https://www.doe.k12.de.us/cms/lib/DE01922744/Centricity/Domain/375/RFA%20Evaluation%20of%20DPAS-II%2011.1.2</a>

<sup>&</sup>lt;sup>27</sup> Research For Action (2017). *Delaware Performance Appraisal System Second Edition (DPAS-II): An Evaluation Report.* Retrieved from <a href="https://www.doe.k12.de.us/cms/lib/DE01922744/Centricity/Domain/375/2017">https://www.doe.k12.de.us/cms/lib/DE01922744/Centricity/Domain/375/2017</a> An%20Evaluation%20Report%20of%20DP <a href="https://www.doe.us/cms/lib/DE01922744/">https://www.doe.us/cms/lib/DE01922744/<a href="https://www.doe.us/cms/lib/DE01922744/">https://www.doe.us/cms/lib/DE01922744/<a href="https://www.doe.us/cms/lib/De01922744/">https://www.doe.us/cms/lib/De01922744/<a href="https://www.doe.us/cms/lib/De01922744/">https://www.doe.us/cms/lib/De01922744/<a href="https://www.doe.us/cms/lib/De01922744/">https://www.doe.us/cms/lib/De01922744/<a href="https://www.doe.us/cms/lib/De01922744/">https://www.doe.us/cms/lib/De01922744/<a href="https://www.doe.us/cms/lib/De01922744/">https://www.doe.us/cms/lib/De01922744/<a href="https://www.doe.us/cms/lib/De01922744/">https://www.doe.us/cms/lib/De01922744/<a href="https://www.doe.us/cms/lib/De01922744/">https:/

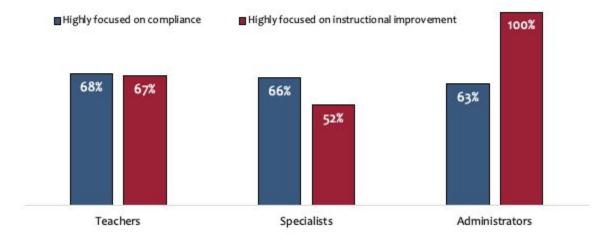
of the system were highly correlated with their perceptions of their system's fairness,<sup>28</sup> indicating that the more that educators believed that their evaluation systems were fair and equitable, the more likely they were to provide a higher letter grade to the system.

Figure 23. Most AES educators reported that their evaluation systems are highly fair and equitable



► Teachers at AES schools reported that their evaluation systems are equally focused on compliance and instructional improvement. Overall, 68 percent of educators reported that AES systems were highly ("very" or "mostly") focused on compliance, compared to 65 percent who reported that their systems were highly focused on instructional improvement. Specialists were more likely to report that AES was focused on compliance (66 percent) than instructional improvement (52 percent). Conversely, all surveyed administrators (100 percent) reported that their evaluation systems were focused on instructional improvement.

Figure 24. Most educators at AES schools reported that their systems are focused on both compliance and instructional improvement



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 $<sup>^{28}</sup>$  r=.69, p<.001

Most experienced teachers at AES schools reported that observations are conducted at the appropriate frequency. AES observation frequency is greater than that of DPAS-II, averaging three, but ranging up to eight observations per year. More than three-quarters (82 percent) of experienced teachers (i.e., teachers with at least four years of experience) reported that their evaluators were conducting observations at an appropriate frequency. Ideally, most teachers (59 percent) would prefer to be observed two to three times a year and reported that they would also like to receive feedback as part of their evaluation at least two to three times a year; 53 percent reported wanting feedback more frequently. Most teachers (63 percent) reported wanting observations to last between 15 and 30 minutes.

Figure 25. Most teachers at AES schools reported wanting at least two to three observations as part of their evaluation

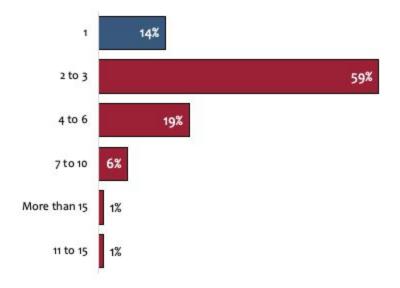


Figure 26. Most AES teachers reported wanting feedback at least two to three times per year

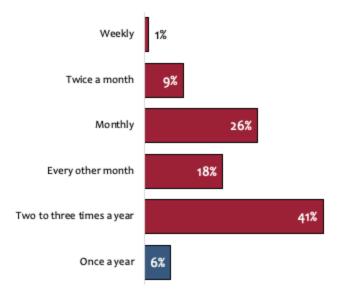
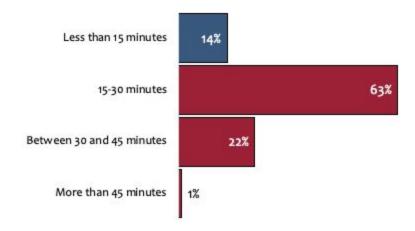
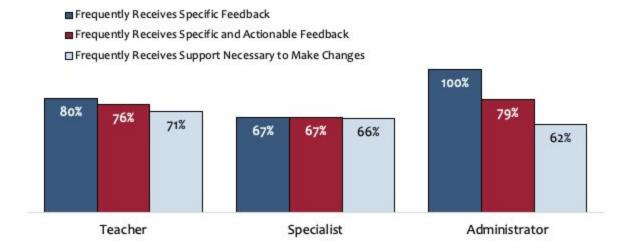


Figure 27. Most AES teachers reported that observations should last between 15 and 30 minutes



▶ Most educators at AES schools reported that the feedback they receive from their evaluators is specific and actionable, but fewer reported that they frequently receive the support necessary to make recommended changes. More than three-quarters (78 percent) of educators reported that they frequently ("often" or "all the time") received specific feedback and 74 percent reported that they frequently received feedback that was both specific and actionable. Though still a majority, only 70 percent reported that they frequently received the support necessary to make changes recommended by their evaluation.

Figure 29. Most educators reported that the feedback that they received was specific and actionable and that they had the support to implement changes



#### Recommendations

#### **For Districts**

- ► Communicate that the primary purpose of the evaluation system is instructional improvement. This analysis shows that when teachers view new systems as designed to support their professional growth, they are more likely to find them fair and give them a higher grade. In response, district and school leaders should communicate that teacher evaluation is part of a comprehensive system designed to improve instructional expertise.
- Align professional development to DPAS-II and explicitly differentiate it based on educator needs. Survey analysis showed that most educators do not feel that the professional development available to them is frequently aligned to DPAS-II. Districts should consider how to more closely align their professional development to DPAS-II and work with DDOE to provide professional development opportunities that specifically relate to areas for growth indicated by an educator's evaluation. Districts may also consider offering differentiated professional development on different components of DPAS-II or on specific criteria within each component.
- Offer additional training for evaluators on DPAS-II implementation, with a focus on providing actionable feedback. Evaluation cannot lead to improvements in performance unless educators receive meaningful feedback and support to implement changes in their practice. Overall, evaluators reported not feeling supported to implement DPAS-II effectively. Districts should work with DDOE to provide training for evaluators on how to write evaluations and facilitate reflective conversations that provide both specific and actionable feedback and help educators make changes to their practice. Further, this training should also provide guidance for evaluators on how to more explicitly tie their feedback to DPAS-II, which will help ensure that even nuanced feedback is actionable.

#### For DDOE

- Revise DPAS-II rubric to reduce components. Educators reported that Components II and III are more effective than other components in both assessing performance and driving student achievement gains. Considering that half of educators (49 percent) feel that reducing the number of components would improve the system, the DDOE should consider revising the rubrics to streamline the number of components based on their perceived effectiveness.
- Increase communication about available DPAS-II resources. Many educators, teachers especially, are not aware of the resources that are available to them on the DDOE website. However, educators who are aware of and have used these resources reported they are useful. Currently, all messaging from DDOE goes through the communications office, which can delay outreach. If possible, the DDOE should explore whether direct outreach to educators is possible. Creating a direct link between the DDOE and educators may be helpful in increasing educators' awareness and use of resources.

▶ Involve teachers in the process of redesigning the system. Most educators do not believe that DPAS-II is achieving its stated goals and report that the system is only somewhat fair and equitable. To better understand and address these perspectives, the DDOE should consider how best to involve teachers in the system redesign, potentially by creating a teacher advisory council to offer their perspectives and provide feedback throughout the process.

#### For Future Research

- ▶ Explore what is leading to differences between AES and DPAS-II. Educators at schools and districts using alternative evaluation systems tend to have more positive perceptions of the effectiveness and fairness of their evaluation systems. The DDOE should conduct additional research to better understand the reasons behind these differences as they consider future improvements to DPAS-II.
- ➤ Conduct mixed methods research to better understand how specific teacher and school characteristics affect perceptions. Though the survey highlights some important trends in how educators perceive DPAS-II across the state of Delaware, these perceptions vary across educators and schools. To better understand what may be leading to this variation in responses, the DDOE should consider adding a qualitative component to future research studies.
- ▶ Consider altering the survey design to increase the response rate. Research has shown that surveys that take longer than 10 minutes to complete will likely result in lower response rates compared to shorter surveys. On average, the 2019 DPAS-II and AES Biannual Survey survey took 20 to 25 minutes to complete. Though frequent tracking and reminders helped ImpactED and DDOE achieve a response rate just under 50 percent, shortening the survey in the future to focus in on the most important questions would likely increase the response rate and require fewer targeted reminders.

## **Appendix A: Weighting Methodology**

Weighting is generally used in survey analysis to compensate for sample designs and patterns of non-response that might bias results. For this particular project, no sample was drawn and survey invitations were sent to the entire target population. Thus, the weighting corrects for discrepancies between the survey respondents and the target population. The sample is weighted to match population parameters for role (administrator, teacher, specialist) and school district.

Weighting was accomplished using SPSSINC RAKE, an SPSS extension module that simultaneously balances the distributions of all variables using the GENLOG procedure. The use of these weights in statistical analysis ensures that the demographic characteristics of the sample match the demographic characteristics of the target population. School districts that account for less than 2 percent of the population were collapsed into one cell for the weighting. Table 1 compares weighted and unweighted sample distributions to population parameters.

Table 1. Weight Summary

	Benchmark	Unweighted Sample	Weighted Sample
Administrator	4.60%	5.56%	4.60%
Specialist	11.80%	12.50%	11.80%
Teacher	83.60%	81.94%	83.60%
School District			
1 Academia Antonia Alonso	0.25%	0.24%	0.25%
2 Academy of Dover Charter School	0.19%	0.14%	0.15%
3 Appoquinimink School District	7.37%	6.96%	7.37%
4 Brandywine School District	8.09%	9.68%	8.09%
5 Caesar Rodney School District	5.67%	5.68%	5.67%
6 Campus Community Charter School	0.20%	0.16%	0.17%
7 Cape Henlopen School District	4.69%	4.82%	4.69%
8 Capital School District	5.18%	4.12%	5.18%
9 Charter School of New Castle	0.43%	0.28%	0.29%
10 Charter School of Wilmington	0.48%	0.44%	0.46%

11 Christina School District	12.36%	12.12%	12.36%
12 Colonial School District	7.09%	6.56%	7.08%
13 Delaware Academy of Public Safety and Security	0.09%	0.08%	0.08%
14 Delaware Design-Lab High School	0.10%	0.04%	0.04%
15 Delmar School District	0.74%	1.08%	1.10%
16 Early College High School at Delaware State University	0.21%	0.18%	0.19%
17 East Side Charter School	0.19%	0.14%	0.15%
18 Edison (Thomas A.) Charter School	0.33%	0.26%	0.27%
19 First State Montessori Academy	0.45%	0.38%	0.39%
20 Freire Charter School	0.20%	0.16%	0.17%
21 Gateway Lab School	0.20%	0.24%	0.25%
22 Great Oaks Charter School	0.09%	0.04%	0.04%
23 Indian River School District	8.10%	9.60%	8.09%
24 Kuumba Academy Charter School	0.38%	0.38%	0.40%
25 Lake Forest School District	2.66%	2.50%	2.66%
26 Las Americas Aspira Academy	0.45%	0.78%	0.81%
27 Laurel School District	1.54%	1.18%	1.22%
28 Milford School District	2.66%	2.64%	2.66%
29 MOT Charter School	0.75%	0.64%	0.67%
30 New Castle County Vocational-Technical School District	3.59%	3.16%	3.59%
31 Newark Charter School	1.47%	1.04%	1.08%
32 Odyssey Charter School	1.16%	1.06%	1.10%
33 POLYTECH School District	0.93%	1.26%	1.29%
34 Positive Outcomes Charter School	0.09%	0.06%	0.06%
35 Providence Creek Academy Charter School	0.38%	0.46%	0.47%

36 Red Clay Consolidated School District	12.02%	11.40%	12.02%
37 Seaford School District	2.53%	2.98%	2.53%
38 Smyrna School District	3.88%	4.10%	3.90%
39 Sussex Academy	0.33%	0.38%	0.39%
40 Sussex Technical School District	0.81%	0.76%	0.79%
41 Woodbridge School District	1.67%	1.80%	1.85%
Small Districts	14.12%	13.66%	14.12%

#### **Variance Estimation for Weighted Data**

Survey estimates can only be interpreted properly in light of their associated sampling errors. Since weighting often increases the variances of estimates, use of standard variance calculation formulae with weighted data can result in misleading statistical inferences. With weighted data, two general approaches for variance estimation can be distinguished. One method is Taylor Series linearization and the second is replication. There are several statistical software packages that can be used to produce design-proper estimates of variances using linearization or replication methodologies, including:

► SAS: <a href="http://www.sas.com">http://www.sas.com</a>

► SUDAAN: <a href="http://www.rti.org/sudaan">http://www.rti.org/sudaan</a>

► WesVar: <a href="http://www.westat.com/westat/statistical-software/wesVar">http://www.westat.com/westat/statistical-software/wesVar</a>

► Stata: <a href="http://www.stata.com">http://www.stata.com</a>

An Approximation Method for Variance Estimation can be used to avoid the need for special software packages. Researchers who do not have access to such tools for design-proper estimation of standard errors can approximate the resulting variance inflation due to weighting and incorporate that in subsequent calculations of confidence intervals and tests of significance. With W\_i representing the final weight of the i^th respondent, the inflation due to weighting, which is commonly referred to as Design Effect, can be approximated by:

$$\delta = 1 + \frac{\sum_{i=1}^n \frac{(W_i - \overline{W})^2}{n-1}}{\overline{W}^2}$$

For calculation of a confidence interval for an estimate percentage, p, one can obtain the conventional variance of the given percentage  $S^2(p)$ , multiply it by the approximated design effect,  $\delta$ , and use the resulting quantity as the adjusted variance. That is, the adjusted variance,  $S^2(p)$  would be given by:

$$\hat{S}^2(\hat{p}) \cong S^2(\hat{p}) \times \delta = \frac{\hat{p}(1-\hat{p})}{n-1} \left(\frac{N-n}{N}\right) \times \delta$$

Subsequently, the (100- $\infty$ ) percent confidence interval for p  $\hat{}$  would be given by:

$$\hat{p} \pm z_{\alpha/2} \sqrt{\frac{\hat{p}(1-\hat{p})}{n-1} \binom{N-n}{N}} \times \delta$$

The survey's margin of error is the largest 95% confidence interval for any estimated proportion based on the total sample— the one around 50%. For example, the margin of error for the entire sample is  $\pm 1.0$  percentage points. This means that in 95 out every 100 samples drawn using the same methodology, estimated proportions based on the entire sample will be no more than 1.0 percentage points away from their true values in the population. It is important to remember that sampling fluctuations are only one possible source of error in a survey estimate. Other sources, such as respondent selection bias, questionnaire wording and reporting inaccuracy, may contribute additional error of greater or lesser magnitude.