

 Exam Master®

Helping Health Sciences  
Programs Better Prepare Our  
Health Care Professionals

# Filling Knowledge Gaps

## Measuring and Improving New-Student Readiness in Dental Schools



## About Exam Master®

At Exam Master, we strive to help health science institutions achieve measurable success in assessing and managing student competency and medical subject matter expertise.

For more than 20 years, Exam Master has been providing health sciences programs with advanced study, online testing, and board certification preparation resources, paired with fully customizable question banks prepared by expert medical professionals.

Learn how Exam Master can help your program prepare students for successful medical careers. Visit us online at [www.exammaster.org](http://www.exammaster.org), call 800-572-3627, or email us at [info@exammaster.org](mailto:info@exammaster.org).

## Executive Summary

According to 2015 data on dental school enrollees, nearly 40% do not come from a biomedical or biologic science background in their prior education or training. Those students who do have a biomedical or biologic science degree come from a wide variety of programs and learning experiences prior to entering dental school.

Together, these factors suggest that otherwise highly qualified and promising enrollees may have knowledge gaps and potentially a high degree of variability in their level of preparedness for success in the demanding dental curriculum.

Left unidentified, these knowledge gaps and uneven preparation can negatively impact the educational experience for dental school students by acting as a drag on their smooth progression through the curriculum. This in turn has a negative effect on program outcomes and program success.

While predictive measures such as Dental Admission Test (DAT) scores and grade point average (GPA) correlate with success in dentistry, they are incomplete tools for determining what incoming dental students do and do not know in the key prerequisite subjects. For example, dental educators tell us that pre-enrollment preparedness in biochemistry is linked to success in dentistry, but DAT scores and prerequisite course grades may not necessarily reveal what students know in depth in that subject.

A readiness assessment is a standardized exam that enrollees complete before or shortly after starting their first year of dental school. These assessments provide detailed insight into strengths and weaknesses in student and cohort knowledge of foundational prerequisite material. That insight, in turn, helps dental school faculty and students address gaps and leverage strengths proactively, with the goal of ensuring that students are adequately prepared for clinical study and dental practice.

This paper outlines for dental program administrators:

1. The key benefits of readiness assessments
2. Important features of readiness assessment programs
3. Guidance for applying the insights that result from detailed assessment feedback



Many  
incoming  
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## Introduction

While data show that the overall applicant pool for dental schools appears to remain strong, the educational profile of incoming students suggests there is likely considerable variability in their biomedical science knowledge and preparedness for the dental curriculum. The result is a potentially significant difference, or gap, between what the students should know in a common core of prerequisite subjects and what they do know.

Within any given cohort this variability in prerequisite knowledge poses challenges for students, faculty, and administrators of dental schools. In 2015, of first-time/first-year students entering dentistry programs :

- 39.6% did not have biomedical or biological science majors
- 26.3% had a science GPA below 3.5
- 15.5% had a total GPA below 3.5
- 18% had DAT Academic Average scores below 19
- 23% had DAT Perceptual Ability and DAT Total Science scores below 19

### The situation today

While incoming dental students are qualified based on prior academic performance and DAT scores, many may lack the broad foundational biomedical knowledge that is essential for success in their didactic and clinical studies. Dental school administrators and faculty indicate a need to identify and fill these knowledge gaps early in each student's dental education for two reasons:

1. **Proficiency in foundational biomedical science is critical** to success in the clinical phase of dental education and in dentistry practice.

<sup>1</sup>"U.S. Dental School Applicants and Enrollees, 2015 Entering Class", Journal of Dental Education, December 2016, p. 1479-1489.

<sup>2</sup>Ibid.

This paper  
addresses  
three  
questions  
that dental  
school  
administrators  
raise most  
frequently  
when  
considering  
readiness  
assessments.

2. **Faculty can teach more efficiently, and potentially more deeply**, when assured that dental students each have a comparable depth of knowledge in core biomedical and related subjects.

To help identify strengths and weaknesses in biomedical science and other core prerequisite subjects at the individual student and cohort level, some dental schools are adopting readiness assessments.

These exams, which schools administer to enrollees before or shortly after first-year classes begin, provide dental schools with a means to:

- **Gauge knowledge levels** in key foundational pre-requisite subjects quickly, fairly, and objectively
- **Plan appropriately and take action** to address knowledge gaps and leverage strengths

### Three key questions

Drawing on input from dental school administrators and faculty, available research, and 20+ years of industry experience, this paper addresses three questions that dental school administrators raise most frequently when considering readiness assessments for newly matriculating students:

1. **What are the primary benefits** of a readiness assessment to students and schools?
2. **What are the key features** of an effective readiness assessment program?
3. **How should schools apply assessment results** to improve student performance and outcomes?

Schools  
relying  
heavily  
on GPA  
and DAT...  
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insight into  
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address  
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preparedness.

## A more complete picture of student readiness

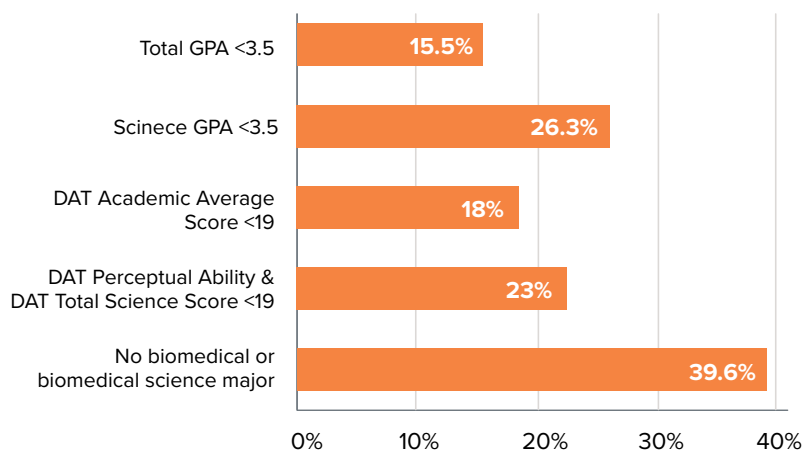
As predictors of student success, DAT scores and student undergraduate GPAs are important tools to guide admission decisions. The challenge for dental schools is that neither the student's DAT scores nor their GPA provide a complete picture of that student's readiness for coursework in dentistry. Even prior course history is not a fully reliable indicator of what an incoming student knows, as the length of time from when the student completed a course can be an important variable.

The problem lies in the fact that DAT scores and GPAs are more summary in nature. They provide a high-level understanding of a student's skills and knowledge, but insufficient detail regarding strengths and weaknesses within specific topics and sub-topics in foundational prerequisite subjects.

The result is that, depending on each student's educational background and a school's admission guidelines, some percentage of students are likely to have weaknesses in biomedical science and/or related disciplines that could negatively impact their future didactic or clinical studies.

In short, schools relying heavily on GPA and DAT to assess individual students' chances for success in the dental curriculum may have inadequate insight into how best to address variability in student preparedness.

### The Knowledge Gaps<sup>3</sup>



<sup>3</sup> "U.S. Dental School Applicants and Enrollees, 2015 Entering Class", Journal of Dental Education, December 2016, p. 1479-1489.

Adopting  
a readiness  
assessment  
requires  
careful  
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and  
preparation.

## Filling the knowledge gaps

Given the potential differences in biomedical knowledge among incoming students in a cohort, and the risk that those differences will inhibit the education experience, it is essential for schools to get an accurate and detailed understanding of each student's knowledge early in his or her dental education.

A readiness assessment presents at least two opportunities to accomplish that goal because it:

- **Provides schools with invaluable insight** into student and cohort-level knowledge in key prerequisite subjects
- **Provides students with specific feedback on their strengths and weaknesses** in the foundational subjects they need to know to succeed in dental school

## Getting ready for readiness

As with any change in school policies or procedures, adopting a readiness assessment requires careful planning and preparation. While a detailed guide is outside the scope of this paper, the following list offers helpful best practices to speed the adoption and implementation process.



### Test early in the calendar.

Administer the test before classes start or within the first 45 days.



### Test online.

Consider an online platform for ease of implementation and the ability to provide students and faculty with immediate feedback.



### Test science and math.

Ensure that questions address core content areas: biomedical, bioscience, and analytical.



### Test in detail.

Ensure that test scores cover topic and sub-topic levels of content for more granular insights.

Sub-topic  
assessment  
scores help  
to focus  
support  
precisely  
where a  
student  
requires it.

## Applying learnings to improve student outcomes

With detailed scoring diagnostics, schools and students have a powerful tool to identify knowledge gaps and strengths.

### Address weaknesses early, with specificity

Students who under-perform in a particular foundational area may seek out (or be assigned) support in a number of forms to gain the requisite knowledge that they lack. Sub-topic assessment scores help to focus support precisely where a student requires it.

A common theme among education research, as well as feedback from industry professionals, is that **support efforts appear to be most effective when they begin early in a student’s program and follow a plan that is specific to the student’s needs.**

Support options vary from school to school. A number of options shown to be effective include:

- Self-directed study and self-testing
- Peer study groups
- Faculty mentoring/counseling
- Pre-requisite study and examination on specific sub-topics
- Pre-requisite coursework on specific topics

The key is to focus support specifically where it is needed. **A “one size fits all” approach to supportive testing and education may actually INCREASE student frustration** rather than aid in student success.

For example, a student who needs improvement in physiology of the nervous system, but is otherwise knowledgeable in physiology, is likely to find a full remedial course in physiology to be more distracting than helpful and a poor use of his or her time.



There  
is also  
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cohort level.

Schools can avoid this risk by leveraging detailed, sub-topic scores to focus support on the knowledge or understanding that each student truly lacks, and which is essential to successful clinical education and dentistry practice.

### **Leverage strengths within the cohort**

While it is useful to leverage assessments as a means to identify and address weaknesses in individual student knowledge, there is also benefit to be gained by understanding weaknesses and strengths at the cohort level.

For example, if an incoming cohort typically demonstrates high preparedness in biochemistry or human anatomy, educators may then be able to adapt their curriculum to spend less time on foundational concepts in those areas, and more time on dentistry-specific content.

In short, early **assessments offer an opportunity to tailor the curriculum** and optimize time spent on more focused learning.



## Contact Exam Master

For more than 20 years, Exam Master has focused exclusively on helping nursing, medical, dental, and pharmacy education programs improve student performance. To learn more about our fully customizable assessment and test-preparation solutions, call (800) 572-3627 or email [info@exammaster.org](mailto:info@exammaster.org).

For more information on readiness assessment programs in dentistry and other health sciences, please email Jim Pearson at [jpearson@exammaster.com](mailto:jpearson@exammaster.com).

## Conclusion

With nearly 40% of dental students coming from majors other than biomedicine and biology, and with significant variation in GPAs and DAT scores, schools witness a high degree of variability in student knowledge in core prerequisite areas such as anatomy, microbiology, and biochemistry. Additionally, DAT scores, GPAs, and prior course history may not sufficiently identify for schools where incoming students may have weaknesses. The result is students starting the curriculum on an uneven playing field.

To ensure that students are adequately prepared for the rigors of didactic and clinical dental coursework, schools should assess student readiness as early as possible in their education. Online electronic testing with carefully constructed assessments can offer the benefits of quick implementation, thorough content coverage, and immediate feedback for students and faculty.

Dental schools considering a readiness assessment can expect:

1. Deep **insight into student strengths and weaknesses** at the individual student and cohort level.
1. More accurate **tailoring of student support** efforts to address individual needs.
1. Greater opportunity to **leverage cohort strengths** to focus time on dentistry-specific content.