



Prerequisite Validation Study

Examination of Reading as a Prerequisite to
EMS-020 (Emergency Medical Technician-I /
EMT – Basic)

Executive Summary

The following met the prerequisite criteria for EMS-020:

- Successfully completing READ-956 or placement into READ-078 or higher
- Successfully completing READ-078 or placement into NO READ

Further research determined the following:

- Successfully completing READ-956 or placement into READ-078 or higher
 - 31% of the EMS-020 students met the prerequisite
 - The success rate of those who met the prerequisite was 60%, compared to 48% for those who did not meet the prerequisite
 - The current EMS-020 success rate is 52% and would increase to 60% with READ-956 as a prerequisite
 - Disproportionate impact did occur when students 19 years or younger were compared with students age 20 or older
 - The success rate differential between the two age groups would decrease from 7.4% to 4.2%, a 3.2% gain with READ-956 as a prerequisite.
- Successfully completing READ-078 or placement into NO READ
 - 21% of the EMS-020 students met the prerequisite
 - The success rate of those who met the prerequisite was 62%, compared to 21% for those who did not meet the prerequisite
 - The current EMS-020 success rate is 52% and would increase to 62% with READ-078 as a prerequisite
 - Disproportionate impact did occur when students 19 years or younger were compared with students age 20 or older
 - The success rate differential between the two age groups would decrease from 7.4% to 4.5%, a 2.9% gain with READ-078 as a prerequisite.

Crafton Hills College Prerequisite Validation Studies

Background

As stated in Title 5 Matriculation regulations (rev. March 1998), Section 55201(a), “the governing board of a community college district may establish prerequisites, corequisites, and advisories on recommended preparation (defined in Section 55200), but must do so in accordance with the provisions of this Article (Matriculation Regulations Article 2.5).” At a minimum, “...prerequisites, corequisites, and advisories on recommended preparation shall be based on content review (Title 5, Section 55201(b)(2).” Content review, “...is conducted by faculty to identify the necessary and appropriate body of knowledge or skills students need to possess prior to enrolling in a course, or which students need to acquire through concurrent enrollment in a corequisite course.” Beyond content review, in some instances additional evidence is required before a district can enforce prerequisites, corequisites, or advisories. As stated in Title 5, Section 55201(3)(e), “a course in communication or computation skills may be established as a prerequisite or corequisite for any course other than another course in communication or computation skills only if, in addition to conducting a content review, the district gathers data according to sound research practices and shows that a student is highly unlikely to succeed in the course unless the student has met the proposed prerequisite or corequisite.”

To assist districts in identifying and establishing “sound research practices,” the California Community College Chancellor’s Office, Academic Senate for California Community Colleges, the California Association of Community Colleges (CACC) Commission on Research, the Research & Planning (RP) Group (at the time divided into two entities – the Northern California Community College Research Group (NORCAL) and the Southern California Community College Institutional Research Association (SCCCIRA)), and the Matriculation Regional Advisory Committee all worked diligently throughout the late 1980s and 1990s to develop a number of seminal

documents that have served as blueprints for researchers engaged in matriculation evaluation. Influential publications include:

- “The Model District Policy for Prerequisites, Corequisites, and Advisories on Recommended Preparation, and Other Limitations on Enrollment” (September, 1993)
- California Community College Chancellor’s Office “Matriculation Regulations” (rev. March 1998)
- “Prerequisites, Corequisites, Advisories, and Limitations on Enrollment” (Fall 1997) – A questions-and-answers document prepared by the California Community College Chancellor’s Office and the Academic Senate of California Community Colleges that provides technical assistance and interpretation of Title 5 regulations.
- “Are Prerequisites Really That Hard to Establish?” – A short follow-up document prepared by Bill Scroggins
- “Matriculation Standards” – Prepared by the Chancellor’s Office, this document identifies the various components of Matriculation and provides cross-references to Title 5 and AB-3 (Seymour-Campbell Matriculation Act of 1986)
- “Matriculation Local Research Options Project” (November, 1989) – the initial document prepared by the California Community College Chancellor’s Office, CACC, SCCCIRA, NORCAL, and the Matriculation Regional Advisory Committee to assist districts in developing and conducting local Matriculation research
- “Assessment Validation Project Local Research Options” (February, 1991)
- “Matriculation Evaluation: Monographs on Designs from the Local Research Options Project” (February, 1992) – the second series of Matriculation research studies presented by the aforementioned groups
- “Matriculation Evaluation: Phase III Local Research Options” (June, 1992) – the third series of Matriculation research designs addressed by the CCCCO, CACC, SCCCIRA, and NORCAL

The Crafton Hills College Office of Research and Planning has thoroughly reviewed these various documents and has incorporated a number of the identified best practices into Matriculation research projects. Specific to the studies referenced in this document, the Crafton Hills College Office of Research and Planning has developed a consistent methodology for examining prerequisites, corequisites, and advisories courses. In this study, the prerequisite and target course are interdisciplinary, therefore, Title V requires that the district gather data according to sound research practices and shows that a student is highly unlikely to succeed in the course unless the student has met the proposed prerequisite (Title 5 §55201). The purpose of this research study is to use

“sound research practices” to examine what extent reading proficiency is a valid predictor of success in EMS-020.

Sample

Five hundred eighty four students made their first attempt in EMS-020 and earned a grade on record during Fall 2008, Spring 2009, or Fall 2009. Of those, three hundred and three students were successful.

Methodology

Working with the Crafton Hills College Office of Instruction, Assessment Office, and the Emergency Medical Services (EMS) faculty – the ORP studied the effect of adding a reading competency pre-requisite as a requirement for entrance into the Emergency Medical Technician-I/EMT – Basic Certificate program; specifically the first course, Emergency Medical Technician-I/EMT-Basic EMS-020. The ORP explored the following reading courses as possible prerequisites for EMS-020; READ 925 (Introduction to Reading), READ 956 (Intermediate Reading), and READ 078 (Advanced Reading). The research is intended to measure the strength of the relationship between students reading level and the successful completion of EMS-020. In this study reading assessment placement and course completion are being treated as equivalent to one another. Table 1 below shows how the reading assessment placements are equivalent to successfully completing a reading course.

Table 1: Reading Course Successful Grades and Equivalent Corresponding Reading Placements.

Successful Grade in Following Course	Corresponding Reading Placement
NA	READ-925
READ-925	READ-956
READ-956	READ-078
READ-078	NO READ

When examining how well the reading assessment test is a valid predictor of student outcomes in EMS there are five possible Criterion/Outcome measures of student course performance:

1. Points or scores
2. Midterm grade
3. Final grade
4. Only Credit/No Credit
5. Successful/Not Successful

The most common measure used is final grade. From a research perspective, use of a final grade is attractive because final grades are accessible from a computer database; however, one difficulty with using final grades as a criterion measure is that students who withdraw may not be included (Rasor, 1991). In addition, grades represent a limited five-point scale of performance and using a five point-scale does not control for instructor variation in evaluation procedures. On the other hand, the EMT program has gone to great lengths to reduce instructor variation by using the same syllabus, text books, quizzes, exams, and grading scheme in every EMS-020 course. In establishing sufficient evidence to enforce prerequisites that have a communication or computational skills component, the Crafton Hills College Office of Research and Planning has taken a three-pronged approach:

Comparison of Performance in the Target Course of Students Who Did and Did Not Meet the Prerequisite:

Using RP Group definitions that have been adopted by the Chancellor's Office, the Crafton Hills College Office of Research and Planning used Management Information System (MIS) data to initially identify all students who earned a grade on record (A, B, C, CR, D, F, FW, NC, I, or W) in the target course, EMS-020 for Fall 2008, Spring 2009, and Fall 2009. While a student may have taken the target course multiple times, for purposes of prerequisite validation only the first attempt in the target course was examined. Further coding was created to identify students who were successful (earned an A, B, C, or CR grade) or unsuccessful (earned a grade of D, F, FW, NC, I, or W) in the target course. Successful grades were divided by total grades earned on record to compute success rate.

Once this step was completed, course outcomes for students who successfully completed the prerequisite course, or tested at an equivalent reading assessment level prior to completing EMS-020 were merged into the target course file. For prerequisite courses, the best attempt (i.e., the highest grade earned in the prerequisite course) was identified and merged into the target file. Using the aforementioned definitions, a student was identified as having met the prerequisite if he/she earned a successful grade on record in the prerequisite course or student earned a sufficiently high enough placement recommendation on assessment test. Conversely, students who did not meet the prerequisite were identified as students who: a) did not take the prerequisite course; b) the highest grade earned on record in the prerequisite courses was a non-successful grade; or c) did not score at an equivalent level on assessment test.

Once the target course outcome of prerequisite completers and non-completers was identified, the Office of Research and Planning conducted an independent samples t-test to determine whether statistically significant differences in target course outcome existed between prerequisite completers and non-completers. The table on page 11 illustrates the overall success rates in the target courses, the success rates of students who met the prerequisites, the success rates of students who did not meet the prerequisites, the percentage of students in the target courses who met the prerequisite, and whether the success rates of completers/non-completers were identified as statistically significantly different ($p < .05$).

Effect Size and Average Percent Gain:

Recognizing that statistically significant differences are often an artifact of sample size (with large samples, only minimal differences can produce statistically significant results; conversely, with small samples large outcome differences may not be identified as statistically significantly different), effect size and average percent gain were also examined. In essence, effect size measures the strength of a relationship between two variables, controlling for the influence of sample size.

Since t-tests were initially used to explore whether statistically significant differences existed between prerequisite completers and non-completers, the logical measure employed by the Office of Research and Planning to determine effect size was Cohen's *d*. Cohen's *d* is defined as the difference between the two means divided by the pooled standard deviation for the two means. Obtaining basic statistical data about the populations in question (means and standard deviations), researchers can easily calculate effect size. While interpretations vary, the most commonly accepted interpretations suggest that a *d* of 0.20 indicates a small effect, 0.50 a medium effect, and 0.80 or higher a large effect. Recognizing the difficulty in identifying a relationship between two variables in a quasi-experimental environment like postsecondary education, for the purposes of the current study sufficient evidence was considered to exist if an effect size of 0.20 or higher was observed.

Restricted Bivariate Correlation Coefficient and Corrections for Restriction of Range:

Correlation coefficients are another method of examining the strength of a relationship between two variables. For the purposes of the current study researchers employed what is probably the most frequently used correlation coefficient, Pearson's Product Moment Correlation Coefficient, more commonly known as Pearson's *r*. The Pearson's *r* employed in the current study examined the relationship between performance in the prerequisite course and performance in the target course. Again recognizing the quasi-experimental nature of postsecondary education, the Chancellor's Office has established a rough rule-of-thumb for obtained correlation coefficient. While usually considered a moderate association, the Chancellor's Office has established a positive correlation coefficient of .35 as sufficient evidence that a relationship exists between a prerequisite course and a target course, assuming that $p < .05$.

While the Pearson's *r* provides an initial measure of the association between two variables, an important consideration is the restricted distribution of prerequisite course grades. In practical terms, only students who *successfully* complete the prerequisite course will be permitted to enroll in the target course. While both distributions

(prerequisite and target course grades) represent continuous data, one – the prerequisite course grades – are restricted to students who were successful in the prerequisite course (“C” grade or higher). Consistent with methodology cited in one of the local research options documents, the Crafton Hills College Office of Research and Planning recalculated the correlation coefficient between the prerequisite and target courses, correcting for restriction of range. The excel spreadsheet on page 11 identify the restricted bivariate correlation coefficients, the number of cases examined in correlation generated, the p value of the correlation, and the correlation after a correction for restriction of range is applied. Again, a correlation coefficient of .35 or higher is considered sufficient evidence when examining the correlation corrected for restriction of range.

For local validation efforts, the Crafton Hills College Office of Research and Planning has developed a simple color-coding scheme to indicate whether sufficient evidence existed to implement the proposed prerequisite:

- **Green** – Sufficient evidence exists to enforce prerequisite (at least two out of three measures supported)
- **Yellow** – Although evidence exists, only one out of three measures supports the prerequisite. Further discussion should occur within the department and the Curriculum Committee before the prerequisite is enforced
- **Red** – Data does not exist to support enforcement of the prerequisite. None of the measures explored meet pre-established criteria
- **Insufficient Data** – While evidence may point to the efficacy of the prerequisite, the sample size is too small to render a reliable decision.

The table on the following page presents evidence for the interdisciplinary prerequisites that were examined and the color-coded recommendation generated by the Office of Research and Planning based upon the data examined.

The Target Course Includes the Following Semesters: Fall 2008, Spring 2009, and Fall 2009.

The Prerequisite Course Includes the Following Semesters: Spring 2004 through Summer 2009.

Selected Students who made their First Attempt in Target Course where a GOR was Earned				Selected Students Best Grade in the Pre-Requisite Course	Success Rate in Target Course of Students who met the Pre-requisite by successfully completing course or placing into equivalent reading course			% of Target Course GOR Earners who Met Prereq	Success Rate in Target Course of Students who DO NOT Meet the Pre-requisite			P Value of the Success Rate Difference between those who meet and do not meet the Pre-requisite	Effect Size	Average % Gain	Restricted Bivariate Correlation Coefficient	Restricted Bivariate Correlation Coefficient N	Restricted Bivariate Correlation Coefficient P	Correlation Corrected for Restriction of Range	Meets Threshold	Disproportionate Impact
Course	Successful	GOR	%	Prereq. Course	Successful	GOR	%		Successful	GOR	%									
EMS-020	303	584	51.9%	READ-925	101	193	52.3%	33.0%	202	391	51.7%	0.879	0.013	0%	0.633	7	0.127	0.809	Not Enough Data	Yes
EMS-020	303	584	51.9%	READ-956	109	182	59.9%	31.2%	194	402	48.3%	0.009	0.234	9%	-1.000	2	0.000	-1.000	t-Test & ES	Yes
EMS-020	303	584	51.9%	READ-078	76	122	62.3%	20.9%	227	462	49.1%	0.010	0.264	10%	0.213	18	0.397	0.277	t-Test & ES	Yes

Green - Sufficient evidence to enforce pre-requisite (at least 2 of 3 measures supported)

Yellow - Further discussion required (1 of 3 measures supported)

Red - Data does not support enforcement of pre-requisite.

Appropriateness of Prerequisites:

EMS-020

- *READ-925*
 - Insufficient data existed to determine the appropriateness of READ-925 as prerequisites for EMS-020.

- *READ-956 Prerequisite:*
 - Students who successfully completed READ-956 had a statistically significantly ($p = .009$) higher success rate (59.9%) in EMS-020 than students who did not successfully complete READ-956 (48.3%).
 - The effect size was .234, indicating a sufficient impact on success if students successfully completed READ-956 prior to enrolling in EMS-020.

- *READ-078 Prerequisite:*
 - Students who successfully completed READ-078 had a statistically significantly ($p = .010$) higher success rate (62.3%) in EMS-020 than students who did not successfully complete READ-078 (49.1%).
 - The effect size was .264, indicating a sufficient impact on success if students successfully completed READ-078 prior to enrolling in EMS-020.

Disproportionate Impact and Differential Prediction

In addition to providing evidence that the proposed prerequisite is “necessary and appropriate” (i.e., “a strong rational basis exists for concluding that a prerequisite or corequisite is reasonably needed to achieve the purpose that it purports to serve” (Title 5, Section 55200(e)), Title 5 regulations also state that the district should conduct, “...an evaluation to determine whether the prerequisite or corequisite has a disproportionate impact on particular groups of students described in terms of race, ethnicity, gender, age or disability, as defined by the Chancellor. When there is a disproportionate impact on any such group of students, the district shall, in consultation with the Chancellor, develop and implement a plan setting forth the steps the district will take to correct the

disproportionate impact.” (Title 5, Section 55201(e)(2)(B)). To clarify, the Chancellor’s Office has operationally defined disproportionate impact, stating that it occurs when, “...the percentage of persons from a particular racial, ethnic, gender, age or disability group who are directed to a particular service or placement based on an assessment instrument, method or procedure is significantly different than the representation of that group in the population of persons being assessed and that discrepancy is not justified by empirical evidence demonstrating that the assessment instrument, method or procedure is a valid and reliable predictor of performance in the relevant educational setting.” Phillips, Spurling, and Armstrong go on to state, “while the issue of access is important, the real question is access for what purpose. Access needs to lead to goal attainment. Without goal attainment, access becomes a meaningless exercise.”

A useful statistical model in analyzing disproportionate impact is classification and regression tree (CART) modeling, a statistical application that is useful in situations in which the overall goal is to divide a population into segments that differ with respect to a designated criterion. In short, CART modeling affords researchers the opportunity to examine the interaction and impact of a number of distinct categorical predictor variables (e.g., gender, ethnicity, and age) on a categorical dependent variable (e.g., met prerequisite/did not meet prerequisite). CART modeling initially identifies the best predictor variable, conducting a splitting algorithm that further identifies additional statistically significant predictor variables and splits these variables into smaller subgroups. CART modeling merges categories of a predictor variable that are not significantly different. This merging, combined with the splitting algorithm, ensures that cases in the same segment are homogeneous with respect to the segmentation criterion, while cases in different segments tend to be heterogeneous with respect to the segmentation criterion. As it applies to disproportionate impact, CART modeling has a number of distinct advantages over traditional statistical applications used to examine categorical data (e.g., chi-square, cluster analysis, etc.). Utilizing CART modeling, researchers can easily determine whether specific aspects of numerous categorical predictor variables merge to provide a more accurate identification of populations

experiencing disproportionate impact (e.g., male Latino students under twenty-one years of age, female Asian students 30 to 34 years of age, etc.).

As it pertains to this study, CART modeling was conducted to determine whether specific student populations disproportionately meet/do not meet the proposed prerequisites. The following predictor variables were entered into each CART model:

Gender:

- Group 1) Male
- Group 2) Female
- Group 3) Unknown/No Response

Ethnicity:

- Group 1) African American
- Group 2) Asian
- Group 3) Caucasian
- Group 4) Hispanic
- Group 5) Native American
- Group 6) Pacific Islander
- Group 7) Other
- Group 8) Unknown/No Response

Age:

- Group 1) 19 or Younger
- Group 2) 20 to 24 Years of Age
- Group 3) 25 to 29 Years of Age
- Group 4) 30 to 34 Years of Age
- Group 5) 35 to 39 Years of Age
- Group 6) 40 to 49 Years of Age
- Group 7) 50 Years of Age or Older
- Group 8) Unknown/No Response

Disability:

- Group 1) Students With Disabilities
- Group 2) Students Who Do Not Have Disabilities

To examine whether disproportionate impact existed, CART models were generated for each possible prerequisite course/target course combination. The last column in the tables on page 11 (“Disproportionate Impact”) identify whether disproportionate impact was observed (“Yes” if disproportionate impact was observed; “No” if disproportionate impact was not observed).

When findings indicate that prerequisites may result in possible disproportionate impact, it is useful to conduct additional research concerning the issues of differential prediction. Differential prediction identifies the best prediction equations that are significantly different for different groups of students (Young & Kobrin, 2001). Differential prediction addresses two questions:

1. Is the predictive power of the test markedly stronger or weaker for particular student groups?
2. Does the test systematically tend to overpredict or underpredict the performance of particular groups?

Differential prediction could not be examined because there were not enough students who had taken the EMS-020 course and completed a reading course. Since we weren't able to look at differential prediction, an alternate method to address the two questions above was used. In evaluating whether a pre-requisite would have a disparate impact, a mathematical comparison must be made of the disproportionately impacted group's predicted success rate versus the success rate of the other group. Accordingly, the predicted outcome of the disproportionately impacted group was examined to determine if there was an increase in the success rates and a decrease in the gap between the expected outcomes for both groups. Consequently, if the success rate gap between the two groups is reduced and the prerequisite increases the likelihood of success for the disproportionately impacted group then it is acceptable to proceed with the prerequisite (Meehl, & Rosen, 1955; Phillips, Spurling, & Armstrong, 2002). Conversely, it is important to remember that there are other considerations besides the success of students. Access to programs and the right to fail are also areas that need to be addressed when considering selection models for highly impacted programs. Access to programs for all groups is an important consideration when trying to promote diversity in the Emergency Medical Service profession. If high standards on a prediction instrument deny access disproportionately to minority groups, then such a selection method might be considered unfair. While the issue of access is important, the real question is access for what purpose. Access needs to lead to goal attainment. Without goal attainment, access becomes a meaningless exercise. Moreover, according to Meehl and Rosen's

argument, given that not all applicants can be served, it makes sense to serve those most likely to succeed. In addition, if a new higher standard were imposed, it is hard to know how many students in each age group in the applicant population would meet that higher standard. As a result, if the differential prediction analysis indicates that the gap between groups is reduced and the likelihood of success increases for the disproportionately impacted group then it is acceptable to institute the prerequisite and monitor the progress of students.

The graphs and tables on the following pages identify:

- student populations by gender, age, ethnicity, and/or disability that experienced disproportionate impact (NOTE: only outcomes that resulted in observed disproportionate impact are included. If a CART model did not identify the occurrence of disproportionate impact (“No” in the Disproportionate Impact columns on pages 11), no further analyses were conducted
- the success rates of segmented groups with and without prerequisite enforcement
- whether the enforced prerequisite results in similar or greater predictive power (i.e., course outcome) for the disproportionately impacted group(s)
- whether enforcement of the proposed prerequisite overpredicts or underpredicts performance of the disproportionately impacted group relative to: 1) all students; and b) students groups that are not disproportionately impacted

READ-925 as a Prerequisite to EMS-020

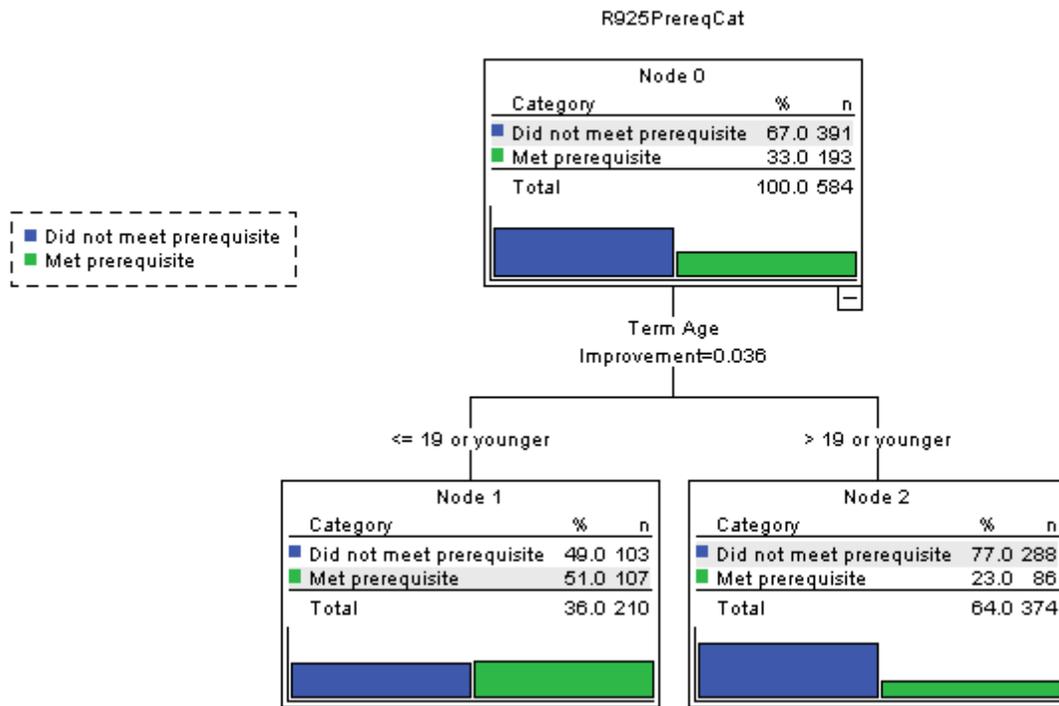
Disproportionate Impact

The figure on the following page uses segmentation modeling to identify disproportionate impact when READ-925 is the prerequisite for EMS-020. Overall, 33% of students who enter EMS-020 successfully complete the READ-925 prerequisite. However, 51% of students age 19 years or younger entered EMS-020 successfully completed the READ-925 prerequisite. Conversely, only 23% of students age 20 years or older who entered EMS-020 successfully completed the READ-925 prerequisite.

This finding, a 28% difference between segments, represents an observed disproportionate impact by age.

Equally important is how the READ-925 prerequisite affects the EMS-020 success rates of students in each segment. As the table on the following page indicates, the current success rate of students 19 years of age or younger is 47.1% while the success rate of students 20 years of age or older is 54.5%, a 7.4% differential. When the READ-925 prerequisite is implemented; 51.4% of students age 19 or younger are successful and 53.5% of students 20 years of age or older are successful. ***Although the success rates of students who are 19 or younger increased 4.3%, the success rates of students in the disproportionately impacted segment (i.e., students 20 years of age or older) decreased 1%.***

CART Segmentation Model Showing Disproportionate Impact When Prerequisite for EMS-020 is READ-925 (Age, Gender, & Ethnicity examined)



*Risk Estimate = .324, SE of Risk Estimate = .019, Improvement set to .01, Child Node set to 5% of Total N, Parent Node is twice the Child Node.

The Impact of READ-925 as a Prerequisite for EMS-020 on the Two Age Categories Identified in the Disproportionate Impact Study

Node	Age	All Students	Students that Meet PreReq	Percent of All Students	Current Success Rate	New Success Rate
1	19 years old or younger	210	107	18.3	47.1	51.4
2	20 years old or older	374	86	14.7	54.5	53.5
	Total	584	193	33.0	51.9	52.3

READ-956 as a Prerequisite to EMS-020

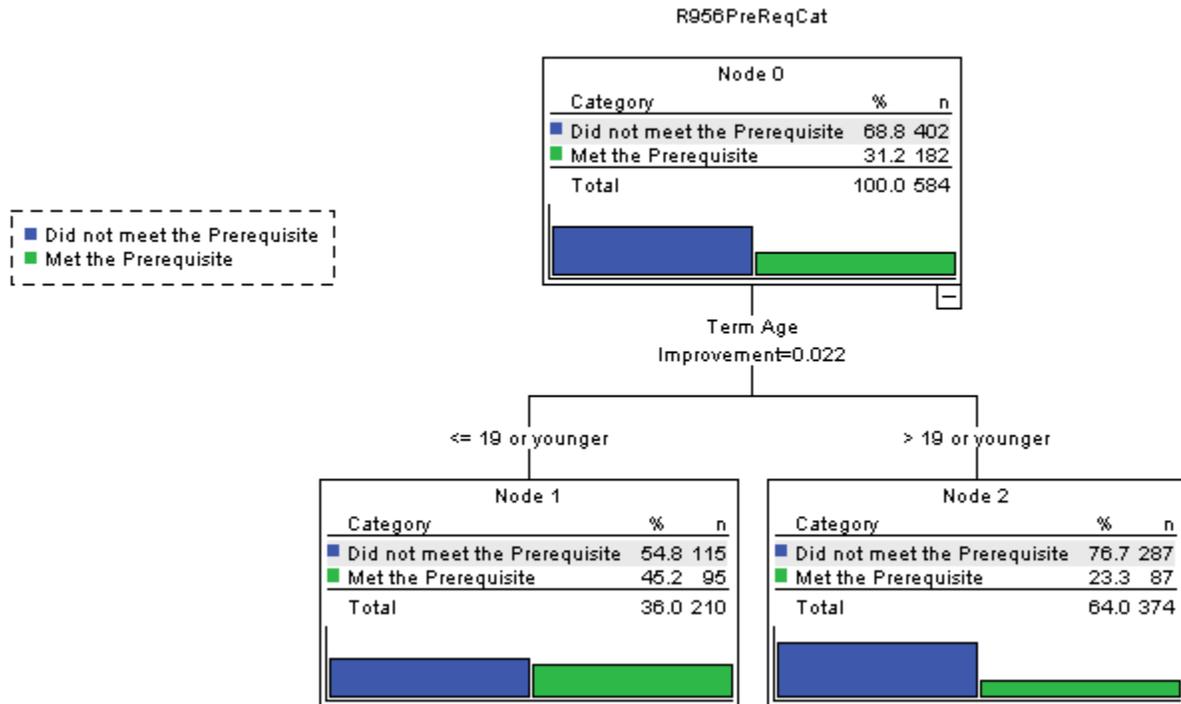
Disproportionate Impact

The figure on the following page uses segmentation modeling to identify disproportionate impact when READ-956 is the prerequisite for EMS-020. Overall, 31% of students who enter EMS-020 successfully complete the READ-956 prerequisite. However, 45% of students age 19 years or younger entered EMS-020 successfully completed the READ-956 prerequisite. Conversely, only 23% of students age 20 years or older who entered EMS-020 successfully completed the READ-956 prerequisite.

This finding, a 22% difference between segments, represents an observed disproportionate impact by age.

Equally important is how the READ-956 prerequisite affects the EMS-020 success rates of students in each segment. As the table on the following page indicates, the current success rate of students 19 years of age or younger is 47.1% while the success rate of students 20 years of age or older is 54.5%, a 7.4% differential. When the READ-956 prerequisite is implemented; 57.9% of students age 19 or younger are successful and 62.1% of students 20 years of age or older are successful. ***Success rates for both groups improved overall; an increase of 10.8% for those in the 19 or younger group. Furthermore, students in the disproportionately impacted segment (i.e., students 20 years of age or older) continue to demonstrate higher course outcomes in EMS-020 at a rate of 7.6%.***

CART Segmentation Model Showing Disproportionate Impact When Prerequisite for EMS-020 is READ-956 (Age, Gender, & Ethnicity examined)



*Risk Estimate = .312, SE of Risk Estimate = .019, Improvement set to .01, Child Node set to 5% of Total N, Parent Node is twice the Child Node.

The Impact of READ-956 as a Prerequisite for EMS-020 on the Two Age Categories Identified in the Disproportionate Impact Study

Node	Age	All Students	Students that Meet PreReq	Percent of All Students	Current Success Rate	New Success Rate
1	19 years old or younger	210	95	45.2	47.1	57.9
2	20 years old or older	374	87	23.3	54.5	62.1
	Total	584	182	31.2	51.9	59.9

READ-078 as a Prerequisite to EMS-020

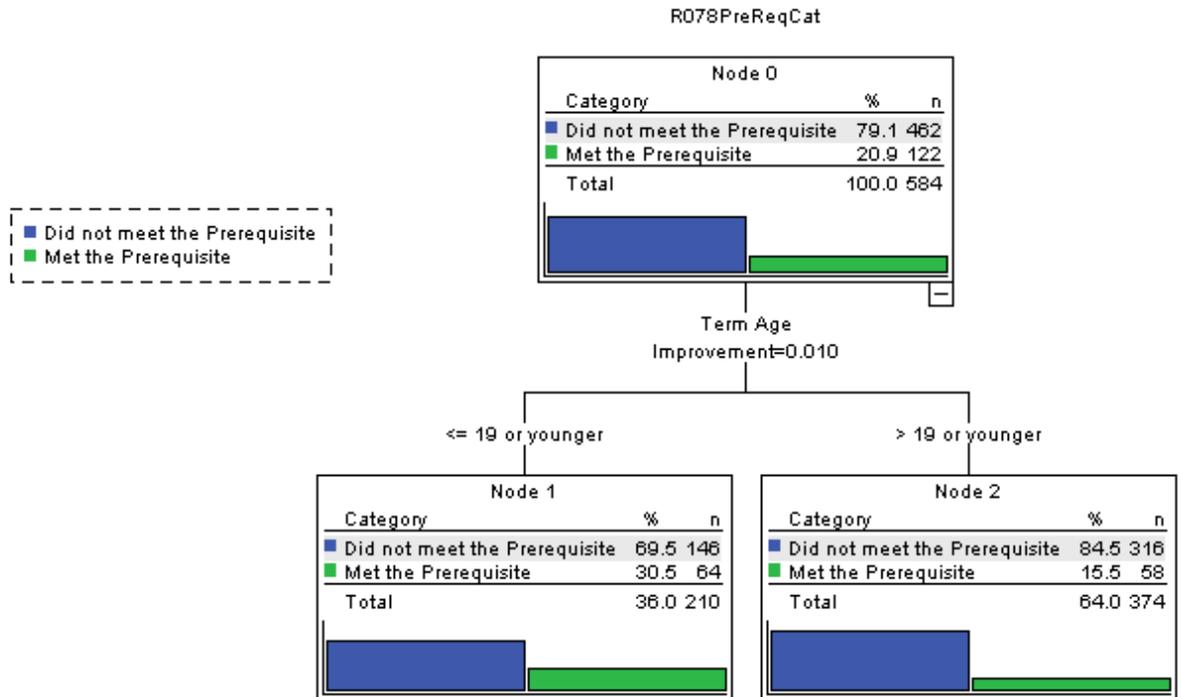
Disproportionate Impact

The figure on the following page uses segmentation modeling to identify disproportionate impact when READ-078 is the prerequisite for EMS-020. Overall, 21% of students who enter EMS-020 successfully complete the READ-078 prerequisite. However, 31% of students age 19 years or younger entered EMS-020 successfully completed the READ-078 prerequisite. Conversely, only 16% of students age 20 years or older who entered EMS-020 successfully completed the READ-078 prerequisite.

This finding, a 15% difference between segments, represents an observed disproportionate impact by age.

Equally important is how the READ-078 prerequisite affects the EMS-020 success rates of students in each segment. As the table on the following page indicates, the current success rate of students 19 years of age or younger is 47.1% while the success rate of students 20 years of age or older is 54.5%, a 7.4% differential. When the READ-078 prerequisite is implemented; 60.9% of students age 19 or younger are successful and 63.8% of students 20 years of age or older are successful. ***Success rates for both groups improved overall; an increase of 13.8% for those in the 19 or younger group. Furthermore, students in the disproportionately impacted segment (i.e., students 20 years of age or older) continue to demonstrate higher course outcomes in EMS-020 at a rate of 9.3%.***

CART Segmentation Model Showing Disproportionate Impact When Prerequisite for EMS-020 is READ-078X2 (Age, Gender, & Ethnicity examined)



*Risk Estimate = .209, SE of Risk Estimate = .017, Improvement set to .01, Child Node set to 5% of Total N, Parent Node is twice the Child Node.

The Impact of READ-078X2 as a Prerequisite for EMS-020 on the Two Age Categories Identified in the Disproportionate Impact Study

Node	Age	All Students	Students that Meet PreReq	Percent of All Students	Current Success Rate	New Success Rate
1	19 years old or younger	210	64	30.5	47.1	60.9
2	20 years old or older	374	58	15.5	54.5	63.8
	Total	584	122	20.9	51.9	62.3

References

- Meehl, P., Rosen, A. (1955). Antecedent probability and psychometric signs. *Psychological Bulletin*, 52(3), 194-216.
- Phillips, B., Spurling, S., & Armstrong, W. (2002). Associate degree nursing: Model prerequisites validation study. *California Community College Associate Degree Nursing Programs by the Center for Student Success and Health are Initiative Sponsored Project*.
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