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Is There a Real Need for the Preparatory Years in Higher Education? An Educational Data Analysis for College and Future Career Readiness

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Abstract: Universities seek to qualify students for their academic and career futures and meet labor market requirements. Hence, a preparatory year is provided to bridge the gap between high school outcomes and the needs of university study plans. The preparatory year is the first year of support in the life of university students, and for decades, it has been recognized as important. It is considered the most crucial stage in the life of university students, where they build and refine their skills and choose their academic major, in which they complete their academic and career life. Due to the importance of this year, which requires the full attention and care of the higher authorities in terms of preparation, development, and renewal, this research outlines the importance of the preparatory year at a local level and in international institutions. Moreover, it sheds light on the details of King Abdulaziz University (KAU) students as a case study. It measures the relationship between the admission weighted ratio (AWR), the college enrollment allocation weighted ratio (CEAWR), and the performance of three batches of male and female students (three consecutive years), with details of students' college allocation after the end of the preparatory year. More importantly, it aims to realize students' progress through their weighted averages during their preparatory year, and the extent to which the goals of the preparatory year are achieved. After an analytic survey of the reality of the preparatory year, based on the statistical tests conducted, this study found that it is not possible to be satisfied with the weighted ratio for colleges' direct allocation of high school students. The tests showed a difference between the AWR and that of the CEAWR, which indicates a change in the level of students' performance from high school to university, due to the positive impact of the preparatory year. More precisely, it was noted that there is a possibility of studying the sufficiency of the weighted ratio for the direct allocation of some colleges in future research.

Keywords: educational data analysis; college enrollment allocation CEA; preparatory year in higher education; university direct admission; student performance

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1. Introduction

In some countries, higher education institutions offer a preparatory year for high school graduates to bridge the gap between school and university education and to well integrate students into the university environment (Batterjee Medical College 2021). Seen as an essential qualitative leap that moves students intellectually and socially from pre-university to academic study, the preparatory year requires effort, research, and creativity (Imam Abdulrahman Bin Faisal University 2021). The preparatory year program is responsible for developing newcomers' scientific and personal capabilities to allow them to choose a specialization appropriate to their abilities and inclinations (Batterjee Medical College 2021; Imam Abdulrahman Bin Faisal University 2021; Good Universities Guide 2021; King Faisal University 2021). The program works on obtaining the learning outcomes of the basic scientific subjects required for the various specializations in college and developing the basic skills for learning in English, computer use, communication skills, learning skills, thinking, and research (King Faisal University 2021). The preparatory year also balances students' personalities by qualifying and training them, and provides them with essential life skills and knowledge by encouraging them to participate in extracurricular activities and community services (Imam Abdulrahman Bin Faisal University 2021; Good Universities Guide 2021; King Faisal University 2021).

Academiccourses, by Keystone Academic Solutions, is a higher education consultancy body that helps students and higher education institutions find each other online. According to Academiccourses, the preparatory or foundation year "is a one-year introduction to a full degree curriculum and prepares students for their entry into university. These programs train students in a wide variety of subjects." Preparatory year programs often consist of language courses for those who are not native speakers in the language of study (Academiccourses 2021). Moreover, they stated that "By opening the door to undergraduate study, a preparatory year also creates the opportunity for significant career improvement."

The concept of preparatory or foundation year programs is adopted worldwide by universities. Academiccourses online, as a search engine for preparatory or foundation year programs, provides students over 293 preparatory or foundation year pogroms in approximately 132 countries, including the USA, Spain, Switzerland, the U.K., Austria, Austria, Russia, and France (Academiccourses 2021). Some of these program tools facilitate the development of the necessary skillsets in students, enhance their personality, and improve their academic performance in a chosen area of study (Academiccourses 2021). Others require the preparatory or foundation year program to ensure that the student can fulfill the minimum requirements for the main degree program such as Arts, Humanities, Business, Biological and Life Sciences, Engineering, Technology, and Natural Sciences. This much importance in the foundation year program indicates that there is a room for studying the impact of this year on students' performance (Academiccourses 2021).

Thus, due to the fact that this year requires the full attention and care of the higher authorities in terms of preparation, development, and renewal, this research outlines the importance of the preparatory year at a global level and in international institutions. Moreover, this study sheds light on the details of King Abdulaziz University (KAU) of Saudi Arabia students as a case study. However, the study results will benefit other national and international universities as they can repeat the research in their unique contexts or take the results as a benchmark before deciding on a new preparatory year program. The following background section explains more about KAU's preparatory year program.

2. Research Background

The preparatory year, comprising the first two semesters studied by King Abdulaziz University students in the Kingdom of Saudi Arabia, was established in 1429 H/2009 (KAU Preparatory Year 2021). The university has noted benefits for students after admission to this transitional phase from secondary to university life. The objectives of this stage are to adapt students to the university environment, strengthen their self-confidence, enhance their abilities in the field of biosciences, computer science, and communication skills, and upgrade their thinking and learning skills.

With the progression of all of the educational means in the Kingdom in general, and at King Abdulaziz University in particular, it has become necessary to develop a new template for the preparatory year of university. This includes new objectives to enable students to discover the appropriate CEA approach, participate in scientific and research forums, and acquire research and development skills. College enrolment allocation (CEA) is the process of students choosing their future colleges after passing the preparatory year. Accordingly, based on the students' desires and grades in this year, the university prioritizes all students until they fill all available vacancies in the colleges. This prioritization is made using a weighted ratio of all of the courses studied in the preparatory year. In this way, the university guarantees justice and equality between students and enables them to enter colleges that suit their academic abilities. In addition, students need to receive the necessary training for the skills required in the new technological age, which is advancing worldwide, and in the Kingdom in particular, under the vision of Saudi Arabia 2030.

2.1. The Importance of the Preparatory Year in Universities

Many studies have indicated that the preparatory year plays a crucial role in preparing students for their university education and university life. Scientific, psychological, and social skills and knowledge are central objectives in the preparatory year. Moreover, there are other objectives related to raising the quality levels in higher education, with some of the most important being:

1. Increasing student continuity and graduation rates by reducing the educational waste resulting from student failure and repeated transfer between disciplines.
2. Rationalizing admissions through appropriate student guidance for colleges that suit their skills and abilities.
3. Providing college students with the necessary linguistic and practical skills and enhancing the skills of new entrants in English, computer use, learning, research, and communication.
4. Improving and regulating institutional resources, equipment, and abilities by reducing recurrent program courses.
5. Preparing students to participate in the academic, social, and research aspects of university life.

2.2. The Mechanism of CEA at KAU

Students in the preparatory year at King Abdulaziz University are given three academic terms to complete the courses and requirements of the preparatory year, without counting the summer term. For this reason, the process of CEA for students of the scientific track (ST) and the administrative and humanities track (AHT) is carried out through two consecutive semesters of the same class and in three stages. The first CEA is at the end of the second semester of each year, the second CEA is at the end of the summer term, if this occurs, and the third CEA is at the closure of the first semester of the following academic year. The closure of the term is intended to mean the end of the period of grade submission and the calculation of student averages. In the absence of a summer term, the second CEA is excluded. The second allocation mechanism is integrated with the third one, and occurs only at the end of the closure of the first academic term of the following year.

The first CEA is for the batch of students who successfully complete the preparatory year requirements in two academic semesters, and the second CEA is allocated to students who complete the preparatory year requirements in the summer semester. Meanwhile, the third CEA is for the same batch of students, but for those who complete the preparatory year requirements in three semesters or who are admitted to the same class, but start studying in the second semester of the year and completed the requirements of the preparatory year in two semesters, namely, the second semester of the year of admission and the first semester of the following year.

Below is a detailed explanation of the three stages of CEA, which are automatically performed by the Deanship of Admission and Registration through structured and accurate steps, as follows.

2.2.1. The First CEA

1. The first CEA takes place after the closure of the second semester of the academic year.
2. All of the standards of accredited and programmed colleges in the system are reviewed by the Deanship of Admission and Registration and matched with the latest High Committee courses for the preparatory year, in addition to all of the direct

updates from His Excellency KAU President for the benefit of the educational process at the university.

3. After reviewing the standards, they are adopted by the Deanship's Vice Dean for the preparatory year and then presented and approved by His Excellency the Dean, and the Electronic Services Unit is directed by the Deanship to be implemented automatically.
4. The stage of opening the applications to students of the preparatory year.
5. After the closure of the second semester, students are sorted, excluding those who have not met the general conditions of CEA, including success in all subjects for the preparatory year in the first and second semesters.
6. The university's higher administration approves the results. The Dean of the Deanship of Admission and Registration then announces the results in students' accounts via the On Demand University Services (Odus Plus) system.
7. After the results are adopted, the declared ratios are installed for use in the second and third CEA processes.
8. Finally, vacant seats in each college in the university's two branches in Sulaymaniyah and Rabigh are calculated.

2.2.2. The Second CEA

1. The second CEA is performed if there is a summer term at the university and is for students who have completed the preparatory year requirements in the summer semester.
2. The number of vacant seats in the university branches is approved by the university's higher administration, the Dean of the Deanship of Admission and Registration, and programmed in the system.
3. The ratios on which the first CEA is closed are installed and approved.
4. Applications from students are sorted, and students are allocated to colleges according to the ratios of the first CEA and the availability of seats.
5. Vacant seats in the university branches are then re-accounted for.
6. Students from both branches can compete for seats, with CEA restored between the university's two branches in Sulaymaniyah and Rabigh, based on the first weighted ratio.

2.2.3. The Third CEA

1. The third CEA takes place after the closure of the first academic semester, and is for last year's batch of students who completed the requirements of the preparatory year in three terms.
2. The same weighted ratios as used for the first and second CEA processes are adopted. Hence, students are subjected to the same criteria and ratios as the rest of their batch.
3. After completion of the CEA process in the university branch in Sulaymaniyah and Rabigh, vacant seats are calculated. This allows all university students to compete for them, taking the weighted ratio adopted after the closure of the second semester into account.
4. Seats are calculated based on the number of graduates in the first and second quarters of each academic year.

2.3. Student Level Standard for Admission

The data used when admitting are to generate student's AWR: General Secondary School Certificate graduates (GSC) ratio, General Aptitude Test (GAT) score, and Academic Achievement Test (AAT) score (see Figure 1).

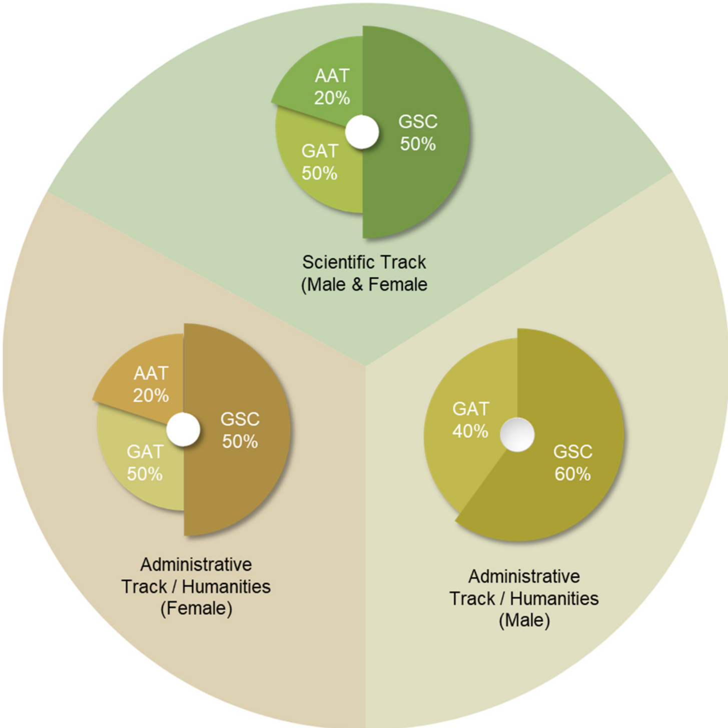

Figure 1. How to calculate the weighted ratio of admission AWR to the tracks for male and female students (KAU Preparatory Year 2021).

- The percentage weighted for the preparatory year scientific track (ST) (male and female students):

$$\text{Weighted ratio} = (\text{GSC ratio} \times 50\%) + (\text{GAT score} \times 30\%) + (\text{AAT score} \times 20\%).$$

- The percentage weighted for the preparatory year administrative and humanities track (AHT) (arts track: Male students):

$$\text{Weighted ratio} = (\text{GSC ratio} \times 60\%) + (\text{GAT score} \times 40\%).$$

- The percentage weighted for the preparatory year administrative and humanities track (AHT) (arts track: Female students):

$$\text{Weighted ratio} = (\text{GSC ratio} \times 50\%) + (\text{GAT score} \times 30\%) + (\text{AAT score} \times 20\%).$$

For this research, the authors found advanced technological platforms in King Abdulaziz University (Brdesee 2021; Assiri et al. 2020; Brdesee 2019b; Brdesee 2018). This technical dimension is the phenomenal advancement of technologies, networks, and communications. King Abdulaziz University has integrated academic services and systems, designed in the latest programming languages, databases, and modern web, in its website applications (Brdesee 2019a; Brdesee et al. 2017; Alsaggaf et al. 2017; Noaman et al. 2017; Brdesee and Alsaggaf 2015). Thus, for the purpose of this research and to provide meaningful feedback based on these data, the authors used three consecutive years of results from students' preparatory years.

3. Literature Review

This section tackles the literature review attempted for this study, based on several axes. The first axis addresses several factors that affect student performance in university education, especially in the preparatory year. Bruinsma and Jansen (2007) examined the nine factors of the Walberg educational productivity model, measuring the academic achievement of first-year university students. According to the study, almost a quarter of the variance in achievement, and the variables of prior achievement and expectancy, are elucidated by eight factors, namely, grades, motivation, age, prior achievement, home environment, support from peers, classroom environment, quality of instruction, and quantity of instruction. To examine differences in the success among first-year university students, Van Der Zanden et al. (2019) analyzed three different domains: Academic achievement, critical thinking disposition, and social–emotional adjustment to university life. The study found that student success is a multi-domain concept, as different groups of students show different patterns of success. Therefore, the study recommended that universities adapt their support to suit student needs.

By analyzing all courses taken by all students in major Canadian universities for a decade, Beaulac and Rosenthal (2019) maintained that machine learning algorithms can utilize extensive data to create useful tools. The study examined how the first two semesters of a student may predict whether they obtain a university degree and may predict a student's major from their registration for the first few courses. In the study, the researchers used random forests, which allowed for reliable variable measurements.

Culver and Bowman (2020) tackled the issue of first-year seminars that are meant to assist students in their university studies. Using quasi-experimental analyses within a large dataset to investigate the connection between students' participation in seminars and their success, the study found that seminars in the first year affect first-year students, but have no effect on students and grades in, for example, the fourth year. The study also found that some factors, such as race, sex, and ACT score, may affect first-year seminars. In a recent study, Kabathova and Drlik (2021) discussed the use of learning analytics to explore the levels of student dropout from university studies using the available educational data. The study attempted to address appropriate features for machine learning classifiers used e-learning courses, which provide access to tests, assignments, exams, and projects. The accuracy rates of the prediction of students who complete vs. drop out of their studies reached 77–93%. The study concluded that many machine learning algorithms may be applied to a scarce educational dataset, while universities need to consider classification performance metrics before using the best performance classification model to predict dropout cases and to suggest intervention mechanisms.

Universities also tend to perform data analyses regarding the link between students' performance in high school and admissions. Niu and Tienda (2010) investigated how a U.S. university used the administrative data derived from the period between 1990 and 2003 to assess the claims that students granted automatic admission underperform academically compared to students who had a competitive environment in high school. The study found that differences in university performance roughly depend on the levels of competitiveness in high schools, rather than test scores. Wolniak and Engberg (2010) also stated that high school impacts academic achievement in the early stages of university education. The researchers found that high school infrastructure and context affect the performance of first-year university students.

Meanwhile, Bone and Reid (2011) investigated how high school affects the performance of university students in their first year, with a focus on biology. When the results were compared to high school results in similar subjects, it was observed that students who completed biology at high school do not perform better than those who did not in a biology course at the first university level. However, in the biochemistry course, learning biology in high school makes a difference. This suggests a need to address the biology curricula at the high school level. In a similar study focusing on physics and math courses, Adamuti-Trache et al. (2013) employed a two-level hierarchical model to find the relationship between university students' performance in their first university year and during their high school education. The researchers maintained that this helps university teachers identify the gap between prescribed and achieved learning outcomes and supports policies and decisions made by high schools and university administrators. The study concluded that university performance in physics can largely be determined by a student's gender and their performance in high school.

In their study, Mennen and van der Klink (2017) investigated predictions of the success of novice music higher education students. The study found a strong relationship between study progress in the first year and in subsequent years, as the findings provided more insight into the predictive ability of the first year. Furthermore, Cyrenne and Chan (2012) maintained that while admission decisions rely principally on high school grades, they can estimate the chances of students' success based on high school grades. The researchers used several alternative estimators in a case study, such as a least square dummy variable model and a hierarchical linear model. The study recommended that admission officials adopt this method to estimate the subsequent performance of first-year students.

Numerous studies have also looked at ways to anticipate students' performance in their first and/or preparatory year at university, helping to identify students that are at risk of failure earlier, so that universities may address their potential problems more quickly. Probing the issue, Namoun and Alshanqiti (2021) studied the literature published over a decade (2010–2020), predicting students' performance based on measurements of learning outcomes. The study found that learning outcomes are calculated based on students' class ranks and their achievement scores, i.e., grades. The study also found that while machine learning models are used to classify performance, the main predictors of students' attaining LOs include online learning activities and assessment grades.

Figueira (2016) investigated the issue from another perspective, using data from Moodle logs to predict students' grades. Using a component analysis approach to stem a decision tree, the study found that the data need to be applied as a whole for a successful prediction of grades, particularly to predict failure. Koretz and Langi (2018) found that grading standards in high schools vary significantly; therefore, they are not sufficient to predict performance at university. As a result, the researchers used regression models to predict the college performance of freshmen based on scores in high school and admission and state tests. The study found that admission tests are significant in offsetting differences in high school grading standards.

Allensworth and Clark (2020) argued that students with the same high school GPA or the same test score (such as ACT test) graduate at very different rates, and that this variation is due to the school attended. The study found that the relationship between high school GPA and graduation is strong, unlike the relationship between ACT score and graduation, which is weak. They concluded that the slope of the relationship varies according to the high school attended. Mayers et al. (2017) studied the influence of novice students' recreation participation, GPA, and engagement. The study found that participation in campus recreation activities positively influences students, which may help university decision-makers make the transition from high school easier, as such participation boosts engagement and yields positive outcomes.

Alamri and Alharbi (2021) probed explainable models to predict students' performance by analyzing and synthesizing the literature on the topic. The study found a need for more research and deeper studies on explainable prediction models for students' performance, as the main predictors used in general for similar current studies are socioeconomic features and pre-course performance. Dorta-Guerra et al. (2019) suggested a new predictive model for academic performance dedicated to science students in their first term of the first year at a major Spanish university. The study explored the most prominent factors for predicting students' results using multiple linear regression models. The study found that the best prediction indicator is high school GPA, and then, by using predictive models, academic performance can be predicted so that early interventions can be implemented to boost students' academic achievement.

Researchers have also paid more attention to the selection of a major in universities, and how a student's performance in his/her first university year and the following years can be reflected by the selection of a major. For example, Pinxten et al. (2015) used multinomial regression to examine how several factors, such as prior subjects, occupational interests, gender, socioeconomic status, and future hopes, may affect major selection. The study found that the main predictor of major selection is prior subject uptake in high school. The study used a binary logistic regression model, which proved that higher achievement in high school boosts academic performance in the first university year.

Jamelske (2009) discussed the first-year experience (FYE) program conducted in American Midwest universities at the end of the 1990s, designed to incorporate curricular and extracurricular components into core courses. The program aimed to integrate students into the university community, and the study examined how this affects GPA and retention ratios. The study found that FYE has some effect on GPA, but not on retention. Wille et al. (2020) studied the reasons why more students tend not to choose STEM careers, using two theories of career choices. The study found that both expectancy value theory constructs and vocational interests contribute differently to STEM major choices. Ludwikowski et al. (2019) examined how far ability provides incremental validity when predicting the choice of major, without resorting to predictions based on personality, self-efficacy, and interests. The study concluded that interests and self-efficacy are not impactful predictors, while personality has some influence, which demonstrates that career counselors need to assess clients' interests and self-efficacy when helping them make career decisions.

The previous research varied in the means of studying the preparatory year and its impact on students' performance and college enrollment. However, this study addresses the assumption that a higher ratio after the preparatory year indicates a higher academic performance than the direct admission ratio of high school students who applied to university. Therefore, the study objectives were:

- To find out how well the admission ratio is balanced with the CEAWR in fulfilling students' college selection;
- To study the relationship between the CEAWR and the AWR;
- To study the possibility of the weighted ratio being satisfactory for use when admitting students directly into colleges.

4. Research Methods

For the purpose of this research, the authors gained the proper data from the Deanship of Admission and Registration at King Abdulaziz University. The nature of such data can be analyzed using statistical techniques; thus, a quantitative research approach was used.

4.1. Data Preparation

All course grades obtained by students were extracted from the university database through the educational information (BANNER) system. This research was conducted between the years 2019 and 2020, and the data were collected for three specific batches, i.e., 2015, 2016, and 2017, in addition to the cumulative rate of students by the end of the preparatory year, taking the track type (scientific or administrative and humanities) into account.

It should be noted that all students surveyed had already completed the preparatory year and had gone on to specialize in colleges. This section of the report focuses solely on presenting statistics in the form of charts of preparatory year KAU students from three consecutive batches (2015–2017). The study samples included approximately 47,000 students (18,391 male and 28,016 female students). We ensured that their results were obtained at the time of admission, during the preparatory year study, and upon receiving their CEA results. The statistics and data included detailed figures for the admission, CEA, and student rates at colleges.

4.2. Analysis of Student Levels with CEA and Admission

Initially, the weighted ratio of students was shown upon admission, with the GSC percentage, as well as GAT and AAT grades. For the preparatory year, we listed the average grades in detail for all courses (preparatory year courses) in both tracks: The scientific track (ST) and the administrative and humanities (AHT) track. The relationship between the weighted ratio of students upon admission AWR, including GSC, GAT, and AAT with CEAWR, was provided after the preparatory year, then listed in colleges for the years 2015 to 2017. It is worth mentioning that the comparison and relationship between all student levels were found in general and in more detail. At the general level, we listed the rate for all study years; however, at the detailed level, we linked the weighted ratio of the student at admission to the cumulative rate after the preparatory year, and examined the relationship between them. For the detailed grades in the courses, we listed the rate each year, linked this with previous years, and then linked this with scientific and literary grades.

5. Data Description and Statistical Methods

This analysis aimed to discover the following:

1. The relationship between gender and type of GSC;
2. The relationship between gender and the college to which the student is admitted;
3. The relationship between the type of GSC and the allocated program after the admission stage;
4. The relationship between the college and the accepted student's ranking of it.

The following tests were applied and analyzed (George and Mallery 2003; Sheskin 2000; Bluman 2011):

1. Descriptive statistics (graph—central measure of tendency);
2. Correlation test;
3. Paired samples *t*-test;
4. Sign test;
5. Chi-square test and Kramer Labs to study the abovementioned relationships.

After organizing the data, we deleted unavailable information on the following variables: The admission ratio, the admitted program, the college, the CEAWR, and the order of desire when admitted (see Table 1).

Table 1. Data description.

Variable	2015	2016	2017
Number of students	18,235	17,740	19,808
Gender	Male or female		
Certificate type	ST or HAT		
Admission ratio/range	[97.765, 62.555]	[98.56, 65.78]	[98.67, 64.19]
Admitted to	Where the student is accepted after the admission stage		
College	The college to which the student is admitted		
University branch	The branch to which the student is admitted		
CEAWR range	[100, 42.614]	[100, 41.61]	[100, 48.34]
Request number when admitted	Achieved rank of student's desire		

5.1. Admission Ratio

The graphs show the admission ratio of students over the three years. The weighted ratio is close to 60 and less than 100, and it is worth noting that none of the students received a 100 admission ratio (see Figure 2 and Table 2).

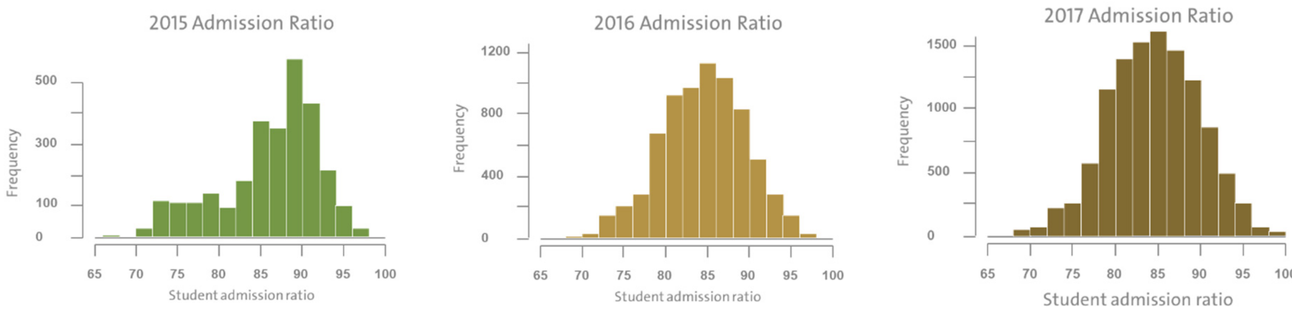

Figure 2. The admission ratio of the students for the three years.

Table 2. The admission ratio of the students for the three years.

	Lowest Value	Intermediate	Medium	Highest Value	Mode
2015	67.17	87.75	86.11	97.77	92.965
2016	65.78	84.64	84.51	98.56	89.515
2017	64.19	84.49	84.49	98.67	81.665

5.2. College Enrollment Allocation (CEA)

The bar charts below show the distribution of students' enrollment allocation to colleges after the preparatory year. We notice that the extent of the weighted ratio is close, ranging from 80 to 100 s, which means that there was a great improvement in the students' ratio compared to the admission rates based on the high school ratio. We can also see that a large number of students received a 100 CEAWR, which is a good indicator that these students will achieve their CEA desire (see Figure 3 and Table 3).

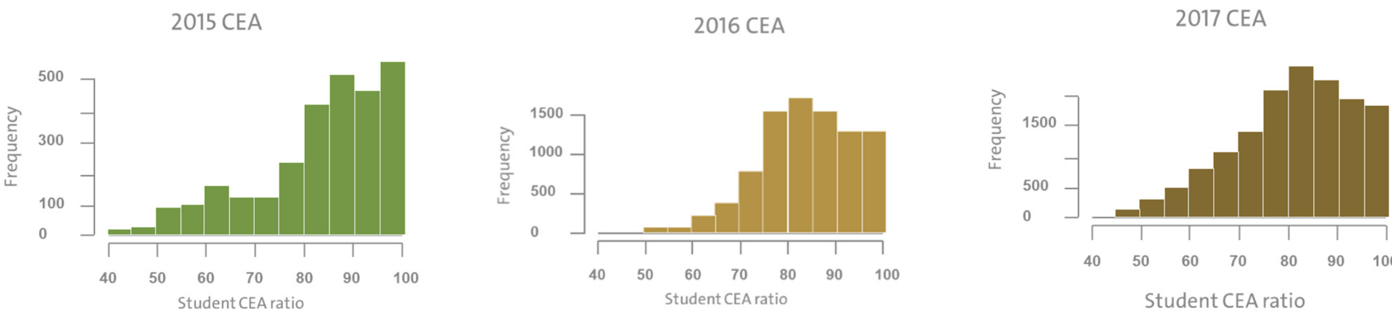

Figure 3. The distribution of students admitted to college after the preparatory year.

Table 3. The distribution of students admitted to college after the preparatory year.

	Lowest Value	Intermediate	Medium	Highest Value	Mode
2015	42.61	86.44	83.47	100	100
2016	41.61	84.04	83.62	100	100
2017	48.34	83.85	83.22	100	100

6. Hypothetical Testing Results

6.1. The Relationship between the Admission and CEA Weighted Ratios

To study the relationship between the admission and CEA weighted ratios, Pearson's correlation test (PCT) was applied and analyzed based on the following hypotheses:

- **Null hypothesis:** There is no relationship between the AWR and the CEAWR;
- **Alternative hypothesis:** There is a relationship between the AWR and the CEAWR.

Based on the analysis shown in Table 4 and Figure 4:

- We refuse to impose the null hypothesis (**$p < \alpha = 0.05$**);
- Therefore, there is a relationship between the admission ratio and the CEAWR over the three years;
- In 2015, the relationship between the admission ratio and the CEAWR was stronger than in the other years, and was equal to 0.797;
- As shown in the graph of the admission and CEA weighted ratios, there is a positive linear relationship with the correlation coefficient (uneven, as shown in the table).

Table 4. P.C.T. results.

	Test Statistics	*p*-Value	Cor.
2015	70.703	$p < 2.2 \times 10^{-16}$	0.797
2016	85.104	$p < 2.2 \times 10^{-16}$	0.667
2017	77.643	$p < 2.2 \times 10^{-16}$	0.591

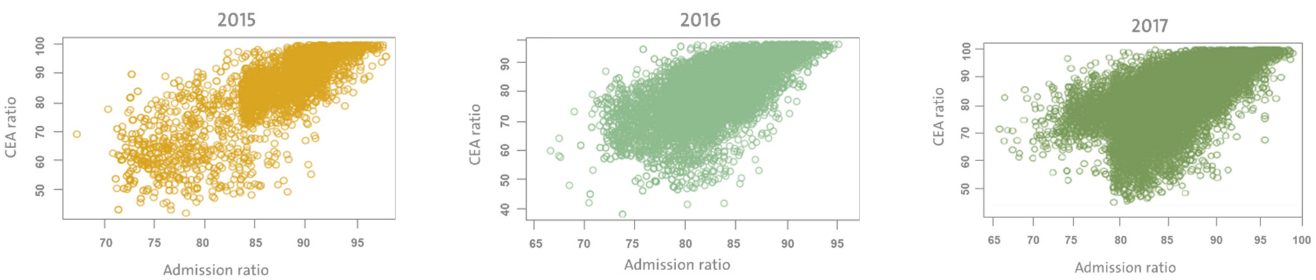

Figure 4. The relationship between the admission and CEA weighted ratios.

6.2. The Difference between the Admission and CEA Ratios

6.2.1. Paired Samples *t*-Test

To study the difference between the AWR and the CEAWR, a paired samples *t*-test was applied and analyzed based on the following hypotheses:

Null hypothesis: Average admission weighted ratio = average CEA weighted ratio; there is no difference between the average admission and CEA weighted ratios.

Alternative hypothesis: Average admission ratio ≠ average CEA weighted ratio; there is a difference between the average admission and CEA weighted ratios.

To use this test, the sample must follow the natural distribution and be in accordance with the central limit theorem; if the sample is greater than 30, it follows the natural distribution.

Based on the analysis shown in Table 5:

- We refuse to impose the null hypothesis (**$p < \alpha = 0.05$**);
- As there is a difference between the admission and CEA weighted ratios for all three years, we cannot be satisfied with the direct college admission (from high school) ratio.

Table 5. The *t*-test Results.

	Test Statistics	*p*-Value
2015	$t = 15.839$	$p < 2.2 \times 10^{-16}$
2016	$t = 11.254$	$p < 2.2 \times 10^{-16}$
2017	$t = 16.375$	$p < 2.2 \times 10^{-16}$

6.2.2. Nonparametric Sign Test

To study the differences between the admission and CEA weighted ratios, a nonparametric sign test of two interconnected samples was applied and analyzed based on the following hypotheses:

- **Null hypothesis:** Average admission weighted ratio = average CEA weighted ratio; there is no difference between the average admission weighted and CEA weighted ratios.
- **Alternative hypothesis:** Average admission weighted ratio ≠ average CEA weighted ratio; there is a difference between the average admission and CEA weighted ratios.

Based on the analysis shown in Table 6:

- We refuse to impose the null hypothesis ($\boldsymbol{p < \alpha = 0.05}$);
- As there is a difference between the admission and CEA weighted ratios for all three years, we cannot be satisfied with the college CEA weighted ratio.

Table 6. Sign Test Results.

	Test Statistics	*p*-Value
2015	V = 2,504,050	$p < 2.2 \times 10^{-16}$
2016	V = 21,588,732	2.758×10^{-8}
2017	V = 34,117,750	2.001×10^{-14}

6.3. The Relationship between Gender and the Type of GSC

To study the relationship between gender and the type of General Secondary Certificate (GSC), a chi-square test (Cramer's V) was applied and analyzed based on the following hypotheses:

Null hypothesis: There is no relationship between gender and GSC type.

Alternative hypothesis: There is a relationship between gender and GSC type.

Based on the analysis shown in Table 7:

- We refuse to impose the null hypothesis ($\boldsymbol{p < \alpha = 0.05}$);
- There is a relationship between gender and GSC type;
- We also noticed that the value of the Cramer's V coefficient for all years converges, which indicates that there is an average relationship between gender and GSC type.

Table 7. Test results: The relationship between gender and the type of GSC.

	Test Statistics	*p*-Value	Cramer's V
2015	$\chi^2 = 422.62$	$p < 2.2 \times 10^{-16}$	0.3844
2016	$\chi^2 = 1489.6$	$p < 2.2 \times 10^{-16}$	0.407
2017	$\chi^2 = 1815.8$	$p < 2.2 \times 10^{-16}$	0.4022

6.4. The Relationship between Gender and the College

To study the relationship between gender and the college to which the student is admitted, a chi-square test (Cramer's V) was applied and analyzed based on the following hypothesis:

Null hypothesis: There is no relationship between gender and the college to which the student is admitted.

Alternative hypothesis: There is a relationship between gender and the college to which the student is admitted.

Based on the analysis shown in Table 8:

- We refuse to impose the null hypothesis ($\boldsymbol{p < \alpha = 0.05}$);

- There is a relationship between gender and the college to which the student is admitted;
- We also noticed that the value of Cramer's V for all three years is close, which indicates that there is an average relationship between gender and the college to which the student is admitted.

Table 8. Test results: The relationship between gender and the college.

	Test Statistics	*p*-Value	Cramer's V
2015	$\chi^2 = 597.82$	$p < 2.2 \times 10^{-16}$	0.4572
2016	$\chi^2 = 2222.9$	$p < 2.2 \times 10^{-16}$	0.4972
2017	$\chi^2 = 3192$	$p < 2.2 \times 10^{-16}$	0.5333

6.5. The Relationship between the Type of GSC and the Allocated Program

To study the relationship between the type of GSC and the program allocated after the admission stage, a chi-square test (Cramer's V) was applied and analyzed based on the following hypotheses:

- **Null hypothesis:** There is no relationship between the GSC type and any allocated program after the admission stage.
- **Alternative hypothesis:** There is a relationship between the GSC type and any allocated program after the admission stage.

Based on the analysis shown in Table 9:

- We refuse to impose the null hypothesis (**$p < \alpha = 0.05$**);
- There is a relationship between the GSC type and any program allocated after the admission stage;
- We also noticed that the value of the Cramer's V coefficient for all years converges, indicating an average relationship between GSC type and any program allocated after the admission stage.

Table 9. Test results: The relationship between the type of GSC and the allocated program.

	Test Statistics	*p*-Value	Cramer's V
2015	$\chi^2 = 1561.3$	$p < 2.2 \times 10^{-16}$	0.5224
2016	$\chi^2 = 3506.8$	$p < 2.2 \times 10^{-16}$	0.4416
2017	$\chi^2 = 5169.8$	$p < 2.2 \times 10^{-16}$	0.4799

6.6. The Relationship between the Allocated College and the Rank of the Desired College

To study the relationship between the allocated college and its ranking by the student when admitted, a chi-square test (Cramer's V) was applied and analyzed based on the following hypotheses:

- **Null hypothesis:** There is no relationship between the allocated college and the students' ranking of it when admitted.
- **Alternative hypothesis:** There is a relationship between the allocated college and the students' ranking of it when admitted.

Based on the analysis shown in Table 10:

- We refuse to impose the null hypothesis (**$p < \alpha = 0.05$**);
- There is a relationship between the allocated college and the student's ranking of it when admitted;
- We also noticed that the value of the Cramer's V coefficient for all years converges, which indicates that there is a weak relationship between the allocated college and the students' ranking of it when admitted.

Table 10. Test results: The relationship between the allocated college and the students' desired ranking of it.

	Test Statistics	*p*-Value	Cramer's V
2015	$\chi^2 = 1788.2$	$p < 2.2 \times 10^{-16}$	0.1918
2016	$\chi^2 = 6328.4$	$p < 2.2 \times 10^{-16}$	0.2166
2017	$\chi^2 = 8703.1$	$p < 2.2 \times 10^{-16}$	0.2353

7. Discussion and Conclusions

The preparatory year, which is considered a transitional phase, allowing students to grow accustomed to the university system, may impact the college enrollment allocation weighted ratio (CEAWR) by either increasing or decreasing it compared to the admission weighted ratio (AWR). This study aimed to understand the differences between the university AWR and the CEAWR after completing the preparatory year, and whether the preparatory year is useful for increasing students' achievement through their weighted averages.

Through the intensive statistical analyses carried out by the researchers in this study, it was found that the CEAWR after the preparatory year is more convincing in assessing the performance of students, and therefore enrollment in colleges is more suitable for this performance. These findings align with other research findings that prove the usefulness of the first year on the prediction of students' success (Bruinsma and Jansen 2007; Van Der Zanden et al. 2019; Beaulac and Rosenthal 2019; Culver and Bowman 2020; Kabathova and Drlik 2021).

On the contrary, many studies have focused on the impact of high school's effect on first-year university students. They found that students' admission and/or performance in university depend on the level of competitiveness in high school (Niu and Tienda 2010), high school context (Wolniak and Engberg 2010), or high school grades (Cyrenne and Chan 2012; Dorta-Guerra et al. 2019; Pinxten et al. 2015). However, the comparison made in this study between the performance of students coming from high school and those who passed the preparatory year shows that direct admission from high school to colleges is less convincing in assessing students' readiness to enroll in colleges. These results have been confirmed by Koretz and Langi (2018), who found that high school grades are not sufficient to predict students' performance at university because grading standards vary significantly.

This indicates a positive change in the level of the student performance between high school and university. Therefore, we can provide the following answer to the main question of this research, does the preparatory year in higher education have a significant impact on students' performance and results? The answer is yes, it does. This positive impact supports the process of student college enrollment allocation.

In the future, the possibility of being satisfied with the AWR can still be studied regarding the direct allocation of college enrolment, which may be independent for some colleges. Moreover, this study recommends that the possible sufficiency of the admission ratio for directly allocating colleges should be considered for students.

This research was conducted between the years 2019 and 2020, and the data were collected for three specific batches, 2015, 2016, and 2017, in addition to the cumulative rate of students by the end of the preparatory year, taking the track type (scientific or administrative and humanities) into account. The results of this study had a great impact on the university decision making between 2020 and 2021, as the university decided to expand the preparatory year track by adding the medical track (MT). Moreover, the study supported the university's decision to open the direct admission for some specific colleges and programs.

Undoubtedly, this analytical study is limited by the sample used, coming only from King Abdulaziz University. However, it can be applied to many universities to generalize its outcomes, thus supporting decision-makers in adopting a variety of types of programs and study plans according to the nature of the colleges.

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