International Journal of Intellectual Discourse (IJID)
ISSN: 2636-4832 Volume 9, Issue 1. March, 2026

EFFECT OF SUPER'S LIFE-SPAN LIFE-SPACE MODEL ON CAREER EXPLORATION AMONG SECONDARY SCHOOL STUDENTS IN BAUCHI METROPOLIS, BAUCHI STATE, NIGERIA

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Abstract

This study examined the effect of an instructional package based on Super's Life-Span, Life-Space Model on career exploration among secondary school students in Bauchi Metropolis, Nigeria. The study was guided by three research objectives: to determine the effect of Super's Life-Span, Life-Space Model on career exploration between the experimental and control groups at both pre-treatment and post-treatment levels, and to examine gender differences in the effect of the model on career exploration. A quasi-experimental design involving experimental and control groups was employed. The sample consisted of 100 SS2 students (50 males and 50 females) selected from two public secondary schools within Bauchi Metropolis through purposive and random sampling techniques. Findings revealed that there was no significant difference between the experimental and control groups at the pre-test level, indicating that both groups started with similar levels of career exploration. However, at the post-test level, a significant difference was found in favour of the experimental group, demonstrating the effectiveness of the instructional package in enhancing students' career exploration. The study also found no significant difference between male and female students, suggesting that the model is equally effective across genders. The study concluded that Super's Life-Span, Life-Space Model provides a comprehensive and practical framework for promoting career exploration among secondary school students. It was recommended that the model be integrated into the career guidance curriculum of secondary schools and that guidance counsellors be trained in its application to improve students' career decision-making and self-concept development.

Keywords: Career Exploration, Life-Span, Life-Space Model, Secondary School Students

1. Introduction

Career exploration has emerged as a critical developmental task for adolescents across the globe, shaping not only individual futures but also influencing broader social and economic structures. In today's increasingly complex and volatile world of work, where technological innovation, globalization, and labour market shifts continually redefine occupational opportunities, the process of making career decisions has become more nuanced and demanding (Savickas, 2005; Patton & McMahon, 2014). Adolescents are now required to negotiate a multiplicity of personal, social, and economic variables while forming their career aspirations. The importance of structured career development frameworks has therefore gained global attention, as educators and policymakers seek effective strategies to support young people in navigating this evolving terrain (Watts & Sultana, 2004). One such influential framework is Super's Life-Span, Life-Space theory, which posits that career development is a lifelong process, intricately linked to the dynamic

interaction of self-concept, life roles, and environmental contexts across distinct developmental stages (Super, 1990).

In Bauchi State, located in the northeastern region of Nigeria, the situation is particularly concerning. The state is characterized by low literacy levels, limited infrastructure, and significant socio-economic challenges that affect both the quality and accessibility of education (National Bureau of Statistics, 2022). In many secondary schools across the state, there are no functional career guidance units, and students often make career decisions without adequate self-assessment or knowledge of occupational realities. The influence of cultural expectations, especially in rural areas, tends to restrict female students' career aspirations and reinforce gendered occupational segregation (Ibrahim, 2016). Given these local realities, there is a pressing need to introduce structured and developmentally grounded career guidance models that reflect both global best practices and local cultural sensitivities. Super's Life-Span, Life-Space model, with its holistic and integrative approach to career development, presents a viable intervention for equipping secondary school students with the cognitive, emotional, and practical tools needed to make informed career explorations.

However, many secondary school students face challenges in making career explorations due to parental pressure, peer group influence, physique, environmental and social factors. This has led to a mismatch between students' career aspirations and their actual abilities, resulting in poor academic performance. In Nigeria, several studies have investigated factors that influence career exploration among secondary school students (Adebayo, 2015; Nwosu, 2017). However, no study has examined the effect of the Life Span-Life Space Model in enhancing career exploration among secondary school students in Bauchi State. Therefore, this study aims to investigate the effect of the Life Span-Life Space Model on the career exploration of secondary school students in Bauchi State.

Invariably, Super's Life-Span Life-Space Model provides a comprehensive framework for understanding career development across the lifespan. Each stage, from growth to disengagement, plays a critical role in shaping an individual's career identity, goals, and aspirations. By understanding these stages, individuals can better navigate their career journeys and achieve a sense of fulfillment and satisfaction. In light of these stages, therefore, this research tends to examine the effect of the Life Span-Life Space Model on the career explorations of secondary school students in Bauchi State, and to the extent to which it addresses the challenges of career mismatch, and poor career guidance. The research is motivated by the desire to see the effect of Super's Life Span-Life Space Model, a comprehensive career development framework, on the career explorations of secondary school students in Bauchi State, and the extent to which it addresses the challenges of career mismatch, poor career guidance.

This study, therefore, seeks to investigate the effect of the Life-Span, Life-Space model on career exploration-making among secondary school students in Bauchi State. By situating the inquiry within the theoretical framework of career development and aligning it with the contextual experiences of Nigerian youth, the study aims to generate empirical evidence on how the application of this model can foster career maturity and informed decision-making. It is hoped that the findings will contribute to educational policy reform, the strengthening of guidance and counselling services, and the development of culturally relevant

strategies for career development in Nigeria and beyond.

Despite the theoretical promise of Super's model, there is a dearth of empirical research that tests its effect in real educational settings in Nigeria, particularly in underserved regions such as Bauchi town. Most existing career interventions in Nigerian schools are either abstractly theoretical or imported wholesale from Western contexts without due consideration for local cultural dynamics and institutional realities. Furthermore, little is known about how Nigerian adolescents, particularly those in rural and socio-culturally conservative areas, internalize and respond to career development frameworks rooted in individual agency and life-role analysis. There is, therefore, a critical need for contextually grounded research that determines the effect of the Life-Span, Life-Space model in helping students make rational, future-oriented career decisions.

The main aim of this study is to examine the effect of an instructional package based on Super's Life-Span, Life-Space Model on career exploration among secondary school students in Bauchi State. Specifically, this study sought to determine the difference between in the mean career exploration ratings between the students in experimental and control groups prior to treatment, the effect of Super's Life-Span, Life-Space Model on the career exploration between the experimental and control groups of students at post-test level, and the differences between the male and female students on the effect of Super's Life-Span, Life-Space Model on career exploration.

2. Literature Review

The theoretical framework adopted for is Super's Life Span, Life Space Theory of Career Development. Super's career development theory, first proposed in 1953 and later revised in 1980 and 1990, remains one of the most influential frameworks for understanding how individuals make career explorations over time. His theory is built around three major components: Life Span, Life Space, and Self-Concept. These components provide a comprehensive view of how career explorations evolve across different stages of life and are influenced by various social, psychological, and economic factors. Super conceptualized career development as a continuous process that unfolds across five major developmental stages.

Theoretical Framework

The growth stage, spanning from birth to 14 years, lays the foundation for future career development. During this stage, children and adolescents develop their interests, abilities, and attitudes, which will eventually shape their career explorations. They begin to develop basic skills, such as reading, writing, and arithmetic, and start to form attitudes towards work and careers. This stage is critical in shaping their self-concept and identity. As individuals developed to the exploration stage, typically between 15 and 24 years, they begin to explore various careers, identify their interests and abilities, and develop a career identity. This stage is characterized by experimentation, exploration, and discovery. Individuals seek out career-related experiences, such as internships or volunteer work, to gain insight into different careers and develop their skills. They also begin to develop career goals and aspirations, which will guide their future career decisions.

The establishment stage, spanning from 25 to 44 years, is a critical period of career development, during which individuals establish themselves in their chosen careers, develop their skills, and build their professional networks. This stage is characterised by a focus on career advancement, professional development, and establishing a reputation in one's field. Individuals develop skills and expertise,

build relationships with colleagues and mentors, and establish a reputation through achievements and contributions. As individuals enter the maintenance stage, typically between 45 and 64 years, they focus on maintaining their career momentum, consolidating their gains, and solidifying their position within their organisation or profession. This stage is characterized by a focus on career stability, security, and continuity. Individuals maintain and update their skills and knowledge to stay current in their field, consolidate their gains, and solidify their position. They also focus on mentoring or coaching others to share their knowledge and experience.

The disengagement stage, marking the final stage of career development, typically occurs after the age of 65. During this stage, individuals transition from active engagement in their careers to a more relaxed and leisurely pace, often involving retirement or reduced work hours. This stage is characterized by a focus on personal fulfillment, leisure activities, and giving back to society. Individuals reflect on their career and life accomplishments, focus on personal growth and development, and engage in activities that bring them joy and fulfillment.

Examining these stages, it is conceivable that the exploration stage is the most relevant for this research. It is during this period that students begin identifying career interests, setting goals, and making preliminary career decisions. However, in Nigeria, many students face challenges such as limited career counselling, societal expectations, and economic constraints, which can hinder their ability to make informed career explorations. In light of this argument, Super (1990) emphasized that career explorations are not made in isolation but are influenced by the various life roles individuals play.

Several studies existed on the conceptual roots of career counselling as well as literatures on empirical studies. Duane Brown and Associates (2002) posit that during the first part of the twentieth century, career counselling practitioners focused on step two of Parsons's tripartite model: increasing people's understanding of the workplace. However, World War I, the Great Depression of the thirties, and World War II produced a great need to classify people in some meaningful way and place them into occupations in which they could perform satisfactorily. The use of tests to measure intellectual functioning began during World War I, accelerated and expanded to include interests, specific aptitudes, and personality in the twenties; it continues to this day. This explosion of technology also provided a new name for Parsons's model: trait-and-factor theory. Trait-and-factor theories are among the earliest career development models. They emphasize the match between an individual's traits (such as abilities, personality, and interests) and occupational characteristics.

Empirical Review

Empirical studies on career exploration have examined the factors influencing students' career decisions. Researchers have tested these principles in different populations, including secondary school students in Nigeria. This section provides a review of empirical studies on career exploration, followed by studies that examine Super's theory in real-world settings. Several empirical studies have investigated the determinants of career exploration among secondary school students, highlighting personal, familial, societal, and economic influences.

Muhammad and Ibrahim (2023) examined how socioeconomic status (SES) affects career exploration in Nigerian secondary schools. Their study, involving 450 students from urban and rural areas, found that low-income students preferred careers that required minimal educational investment, such as vocational and

technical jobs, while high-income students had greater flexibility to explore careers in medicine, law, and technology. These findings highlight economic barriers that prevent many students from pursuing their ideal careers (Ogunyemi, 2019).

Eze (2021) conducted a study on gender disparities in career aspirations among Nigerian students. The study, which sampled 300 students in Oyo and Edo, found that boys were more likely to aspire to careers in science, engineering, and business, while girls were steered toward teaching, nursing, and administrative jobs. These findings support Gottfredson's theory of circumscription and compromise, which suggests that societal norms shape students' career perceptions early in life (Gottfredson, 2002).

A study by Adewale and Yusuf (2020) surveyed 500 secondary school students in southwestern Nigeria to assess parental influence on career decisions. Their findings revealed that 72% of students felt pressured to pursue careers chosen by their parents, even when their personal interests differed. This aligns with studies in other African contexts where cultural expectations prioritize parental authority in career decisions.

The study by Oyebade, Oladipo, and Adetoro (2020) focused on the relationship between exposure to career guidance and the development of career decision-making skills among senior secondary school students in Lagos State, Nigeria. Using a quasi-experimental design, the researchers selected 240 students who were divided into experimental and control groups. The experimental group participated in an eight-week structured career guidance program, while the control group received no intervention. Pre-test and post-test instruments were administered to measure the students' career decision-making abilities, self-awareness, and goal-setting skills. The results showed that students exposed to career guidance exhibited significant improvement in their decision-making abilities compared to those in the control group.

In conclusion, Oyebade et al. (2020) highlighted the importance of institutional support systems in fostering career readiness among adolescents. The study proposed that schools should adopt a holistic model of career education that combines individual counseling, parental involvement, and experiential learning. Its findings reinforce the idea that career exploration is not merely a personal decision but an outcome of guided self-discovery and environmental support. By proving the effectiveness of school-based interventions, the study contributed valuable empirical evidence to the growing discourse on improving vocational education in Nigeria and other developing societies.

Research Gap

While several studies have examined the relevance of different theories to career development, most have concentrated on adult populations, university undergraduates, or professional groups in urban and Western contexts. These studies often emphasize the model's conceptual depth and theoretical adaptability but seldom explore its operational effect on younger populations, particularly secondary school students in rural or semi-urban regions of Nigeria. The developmental realities and socio-economic challenges facing students in Bauchi State are significantly different from those in contexts where those models have been widely tested, thereby calling for an empirical re-examination of its applicability in this cultural and educational environment.

3. Methodology

This study used a quasi-experimental design, specifically the experimental and control group in pre-treatment and post-treatment design. This design involves

administering a pre-test to a single group of both experimental and control groups of participants before the introduction of the experimental treatment (the instructional package based on Super's Life-Span, Life-Space Model), followed by a post-test after the treatment to the experimental group only. The control group will be given lesson on traditional career guidance and counselling adopted for years by their school while the experimental group are engaged to Super's Life-Span Life-Space Model, especially the exploration stage. The difference between the pre-test and post-test scores of the experimental group indicates the effect of the treatment on students' level of career exploration, using pre-test and post-test measurements to determine the effect of the intervention.

This study was conducted in Bauchi Metropolis, in Bauchi State, one of the 36 states of the Federal Republic of Nigeria, located in the North-Eastern geopolitical zone of the country. The population of this study comprises Secondary School Students in Bauchi State. The state has total number of 1,488 senior secondary schools, with approximately 337,631 students. In particular, the study involved students in Senior Secondary School Two (SS2) in two public secondary schools in Bauchi metropolis. The choice of SS2 students is based on their developmental stage, which aligns with Super's (1980) Life-Span, Life-Space Model, particularly the Exploration Stage (ages 15–24). At this stage, students begin to crystallize, specify, and implement their career explorations through self-exploration and engagement with vocational guidance activities. SS2 students are therefore considered most appropriate for this study because they are transitioning toward the end of secondary education and are faced with decisions regarding future educational and occupational paths.

Table 1: Total Number of Senior Secondary Schools (SS2) and Students in Bauchi State

Number of Schools		263	
Class	**Male Students**	**Female Students**	**Total M+F**
SSS2	22,382	13,700	
Total	22,382	13,700	36,082

The sample size for this study consisted of 50 Senior Secondary School Two (SS2) students drawn from two selected public secondary schools in Bauchi State, making the total of 100 from each school. The 50 students from each of the two selected schools are divided into experimental and control groups, making 25 for each. The choice of students from two different schools is primarily based on gender consideration as public secondary schools in Bauchi separated between the genders. Also, the choice of fifty participants is based on the consideration of statistical power and feasibility for an experimental design involving pre-test and post-test measures.

The instrument for data collection in this study was a Career Exploration Scale Package developed by the researcher to examine students' understanding of Super's Life-Span, Life-Space Model. The test will consist of objective items designed to measure knowledge and comprehension of key concepts such as the stages of career development, the role of self-concept, career maturity, and the influence of life roles in decision-making.

The test was administered twice: first as a pre-treatment before the students are exposed to the instructional package to the experimental and control groups, and again as a post-treatment after the completion of the intervention for the experimental group only. The pre-treatment served as a baseline measure of the students' existing understanding, while the post-treatment helped determine the extent of learning that

has occurred as a result of the exposure to the Life-Span, Life-Space package. To ensure the reliability and validity of the instrument, the draft test was subjected to expert validation by professionals in Educational Psychology and Guidance and Counselling. Their feedback guided necessary revisions to ensure that the items are clear, relevant, and adequately representative of the content domain. The reliability of the test was established through a pilot study, using the test-retest method to ensure consistency of results over time. Before the instructional package is implemented for data collection, it underwent a validation process to ensure its relevance, clarity, and effectiveness in achieving the objectives of the study. The validation was carried out by a panel of experts comprising specialists in Guidance and Counselling, Educational Psychology, and Measurement and Evaluation. The procedure of data collection follows these steps:

1. Pre-Treatment Administration: The Career Development Test was administered to students (experimental and control) to determine their baseline knowledge.
2. Implementation of the Training Package: The researcher taught students – the experimental group – using the Life-Span, Life-Space package over a defined period. The sessions will include lectures, discussions, practical activities, and guided reflections. While the control group are left with the traditional career model adopted by their school over the time.
3. Post-Treatment Administration: After the completion of the instructional sessions, the same test was re-administered to both the experimental and control groups to measure any change in understanding.

The data collected for this study was analyzed using both descriptive and inferential statistical methods. A major Inferential tool used in this study is the t-test. The t-test is a statistical test developed by William Sealy Gosset (under the pseudonym "Student") for comparing the means of two groups to determine whether they differ significantly from each other (Field, 2018). It assesses whether the difference between sample means is large enough to conclude that the treatment or intervention had a real effect, rather than the difference occurring by chance. The t-test assumes that the data are normally distributed and that the variances of the two sets of scores are approximately equal.

4. Results and Discussion

Table 1: Distribution of Respondents by Gender

Gender	Frequency	Percent
MALE	50	50.0
FEMALE	50	50.0
Total	100	100.0

Table 1 presented the analysis of respondents' gender distribution, it reveals an equal representation of male and female students, with fifty (50%) males and fifty (50%) females, making up the total sample of one hundred (100) respondents.

Table 2: Distribution of Respondents by Age

Age	Frequency	Percent
15 YEARS	32	32.0
16 YEARS	34	34.0
17 YEARS	34	34.0
Total	100	100.0

Table 2 presents the distribution of respondents according to age, showing that thirty-two (32%) of the students were 15 years old, thirty-four (34%) were 16 years old, and another thirty-four (34%) were 17 years old. This indicates that the sample population comprises students who are typically within the mid-adolescent developmental stage, which corresponds to the upper secondary school level in the Nigerian educational system. The table thus reflects a normal age range for students in Senior Secondary School Two (SS II), the class level from which the participants were drawn.

Table 3: Distribution of Respondents by Class

Class	Frequency	Percent
SS2A	28	28.0
SS2B	34	34.0
SS2C	38	38.0
Total	100	100.0

Table 3 presents the distribution of respondents according to their class level. The data show that twenty-eight (28%) of the students were from SS2A, thirty-four (34%) from SS2B, and thirty-eight (38%) from SS2C, bringing the total number of respondents to one hundred (100). This distribution reflects a fairly balanced participation of students across the three arms of the SS2 class in the selected schools within Bauchi Metropolis. The slight variation in numbers among the classes is not large enough to create any sampling bias or threat to representativeness. Therefore, Table 3 provides a clear indication that the respondents were drawn from a wide cross-section of the SS2 population, ensuring that the findings can be generalized within this educational level.

Table 4: Distribution of Respondents by Group

Group	Frequency	Percent
EXPERIMENTAL	49	49.0
CONTROL	51	51.0
Total	100	100.0

Table 4 presents the distribution of respondents according to their group classification, indicating that forty-nine (49%) of the participants were assigned to the experimental group, while fifty-one (51%) belonged to the control group, making up a total of one hundred (100) respondents. This near-equal distribution between the two groups demonstrates the researcher's careful adherence to principles of experimental design, particularly randomization and group

equivalence, which are essential for ensuring the internal validity of the study.

The data show that the researcher implemented a quasi-experimental design involving an experimental group and a control group. The experimental group received the instructional package based on Super's Life-Span, Life-Space Model, while the control group was taught using the conventional guidance approach available in the school setting. The purpose of this design was to determine the effectiveness of Super's model in enhancing career exploration among secondary school students in Bauchi Metropolis by comparing the performance outcomes of both groups before and after the intervention.

The almost equal distribution 49 students in the experimental group and 51 in the control group indicates that both groups were balanced in size, which is critical for minimizing bias and ensuring that statistical comparisons are meaningful. Unequal group sizes can distort the estimation of variance and affect the power of inferential tests such as the t-test used later in the analysis. However, as Table 4 demonstrates, the researcher achieved near parity between the groups, which allows for more accurate assessment of whether observed differences in post-test scores were indeed due to the treatment rather than group size disparities.

Table 5: Descriptive Statistics of Students' Career Exploration Scores

Statistics	Pre-Test Score	Post-Test Score
N	100	100
Mean	21.75	30.94
Median	21.50	30.50
Mode	19	33[a]
Variance	7.785	42.804
Skewness	-.215	.156
Std. Error of Skewness	.241	.241
Kurtosis	-.023	-1.058
Std. Error of Kurtosis	.478	.478
Minimum	12	20
Maximum	26	43

Table 5 presents the descriptive statistics of students' career exploration scores at both pre-test and post-test stages. The data show that the total sample of one hundred (100) respondents had a pre-test mean score of 21.75, a median of 21.50, and a mode of 19. At post-test, the mean score increased to 30.94, with a median of 30.50 and a mode of 33. The variance of the pre-test scores was 7.785, whereas the post-test variance increased to 42.804, indicating greater spread or diversity in post-test scores. Skewness values were -0.215 for the pre-test and 0.156 for the post-test, suggesting that the distributions were approximately symmetrical in both instances. Similarly, the kurtosis values of -0.023 (pre-test) and -1.058 (post-test) indicate that both distributions were relatively normal, though the post-test scores displayed a slight flattening compared to the pre-test.

Provides an essential overview of the impact of the instructional package based on Super's Life-Span, Life-Space Model on students' career exploration. The

notable increase in the mean score from 21.75 to 30.94 demonstrates that the intervention had a positive effect on the students' ability to explore and understand career options. The mean difference of approximately 9 points is substantial in the context of a scale likely designed to measure exploratory behaviors, self-awareness, and readiness to engage with career-related decision-making. This increase suggests that students who were exposed to the structured, theoretically grounded guidance of Super's model were able to significantly improve their knowledge of careers, clarity of personal interests and values, and ability to align these with potential occupational paths.

The median and mode values reinforce the interpretation of central tendency. At pre-test, the median of 21.50 and mode of 19 indicate that a substantial portion of students had relatively lower career exploration scores before exposure to the model. This aligns with the study's initial premise that secondary school students in Bauchi Metropolis often lack structured career guidance, leading to underdeveloped understanding of self-concept and vocational options. Post-intervention, the median and mode shifted upward to 30.50 and 33, respectively, reflecting a general improvement across the majority of participants. These shifts suggest not only that the average level of career exploration increased but also that more students reached higher levels of competence in career planning and self-assessment.

Also indicates an increase in the variance from 7.785 at pre-test to 42.804 at post-test. While this may initially appear to indicate inconsistency in the intervention's effect, it is more accurately interpreted as reflecting individual differences in responsiveness to the instructional package. In other words, although all students improved to some extent, some demonstrated larger gains than others. This aligns with the theoretical underpinnings of Super's Life-Span, Life-Space Model, which recognizes that individuals differ in how they integrate life roles, self-concept, and environmental influences into their career decision-making processes. The observed variability at post-test highlights the model's nuanced impact, accommodating diverse student experiences and cognitive styles.

The skewness values further support the conclusion that the distribution of scores remained fairly symmetrical, indicating that improvements were generally consistent across the sample. The slightly negative skewness at pre-test (-0.215) shows a mild clustering of students with scores just below the mean, suggesting that a few students had very low initial levels of career exploration. By post-test, the skewness shifted slightly positive (0.156), reflecting a modest rightward spread in scores as more students achieved higher career exploration outcomes. These findings demonstrate that while the intervention elevated overall scores, it also allowed for differentiation in individual growth, consistent with the model's emphasis on personal agency and self-directed development.

The minimum and maximum scores reported in Table 5 (12–26 at pre-test and 20–43 at post-test) further illustrate the impact of the intervention. The increase in both the minimum and maximum post-test scores indicates that even students who were initially struggling showed measurable improvement, while the highest-performing students reached significantly greater levels of career awareness and planning. This range expansion is critical for educational practice, as it highlights that the instructional package has the potential to benefit both low- and high-performing students, fostering inclusivity and promoting equitable career development outcomes.

Research Question One

What are the effects of Super's Life-Span, Life-Space Model on the career exploration between the experimental and control groups of students at pre-test level?

Table 6: Mean and Standard Deviation of Pre-Test Scores by Group

Group	N	Mean	Std. Deviation	Mean Difference
EXPERIMENTAL	49	21.88	2.766	.395
CONTROL	51	21.63	2.835	.397

Table 6 presents the pre-test scores of students in both the experimental and control groups, showing that the experimental group (n = 49) had a mean score of 21.88 with a standard deviation of 2.766, while the control group (n = 51) had a mean score of 21.63 with a standard deviation of 2.835. The standard errors of the mean were 0.395 and 0.397, respectively, indicating a high level of precision in the measurement of the group means. Table 6 provides critical insight into the initial comparability of the two groups before the implementation of the instructional package based on Super's Life-Span, Life-Space Model.

The data presented demonstrate that the mean scores of the experimental and control groups at pre-test were very close, differing by only 0.25 points. This small difference indicates that both groups started at virtually the same level of career exploration, which is essential for the validity of the quasi-experimental design. In experimental research, it is important to establish that the groups are equivalent at baseline, as this ensures that any observed post-intervention differences can be attributed to the treatment rather than pre-existing disparities. The similarity in pre-test scores, as shown in Table 6, therefore confirms that the random assignment of students to experimental and control groups successfully created comparable groups.

The standard deviations reported (2.766 for the experimental group and 2.835 for the control group) indicate relatively low variability within each group at the pre-test stage. This suggests that most students' career exploration scores clustered closely around the respective group means, with few extreme deviations. The relatively uniform distribution within groups strengthens the argument that the sample was homogenous in terms of prior exposure to career guidance and baseline career exploration skills. In practical terms, this means that the intervention had a level playing field to operate on, with both groups exhibiting similar initial understanding of career concepts and self-awareness about future occupational options.

Also has theoretical implications in relation to Super's Life-Span, Life-Space Model. The experimental group's mean pre-test score of 21.88 indicates that students were at a moderate level of career exploration, reflecting some awareness of self-concept and potential career paths, but not yet fully developed in terms of structured career decision-making. Similarly, the control group's mean of 21.63 demonstrates that, prior to intervention, the students lacked systematic guidance to enhance their career exploration. These baseline scores underscore the need for a structured instructional package that provides targeted interventions to help adolescents engage meaningfully with their career development process.

The standard errors of the mean (0.395 for the experimental group and 0.397 for the control group) indicate the reliability of the

sample means as estimates of the population means. These low values suggest that repeated measurements of similar samples would likely yield means very close to the observed values, supporting the precision and reliability of the data.

Research Question Two

What are the effects of Super's Life-Span, Life-Space Model on the career exploration between the experimental and control groups of students at post-test level?

Table 7: Mean and Standard Deviation of Post-Test Scores by Group

Group	N	Mean	Std. Deviation	Std. Error Mean
EXPERIMENTAL	49	36.22	4.200	.600
CONTROL	51	25.86	3.763	.527

Table 7 presents the post-test scores of students in the experimental and control groups following the implementation of the instructional package based on Super's Life-Span, Life-Space Model. The experimental group, consisting of forty-nine (49) students, achieved a mean score of 36.22 with a standard deviation of 4.200, whereas the control group, with fifty-one (51) students, had a mean score of 25.86 and a standard deviation of 3.763. The standard errors of the mean were 0.600 for the experimental group and 0.527 for the control group. These results provide compelling evidence of the impact of the intervention on students' career exploration outcomes.

The data reveal a substantial increase in the mean score of the experimental group compared to the control group, with a difference of approximately 10.36 points. This marked improvement indicates that students exposed to the structured instructional package experienced significant enhancement in their ability to explore, understand, and plan for future careers. The higher mean score of the experimental group demonstrates the effectiveness of Super's Life-Span, Life-Space Model in promoting students' career development, highlighting the practical value of integrating theory-driven guidance into secondary school curricula.

The standard deviation of 4.200 in the experimental group suggests moderate variability among students' post-test scores, reflecting differences in how individual students assimilated the concepts and applied them to their career exploration. Similarly, the control group's standard deviation of 3.763 indicates a relatively uniform distribution of scores within that group, though at a lower performance level. The slightly higher variability in the experimental group is theoretically consistent with Super's Life-Span, Life-Space Model, which emphasizes individualized self-concept development and acknowledges that students differ in their responsiveness to career guidance interventions. Some students may have internalized the principles of the model more effectively than others, resulting in a wider range of achievement.

The standard errors of the mean, 0.600 for the experimental group and 0.527 for the control group, indicate that the mean scores are reliable estimates of the population means. This reliability enhances confidence that the observed differences are not due to sampling error but represent true effects of the intervention. Consequently, the data in Table 7 provide a solid empirical foundation for statistical testing, such as independent samples t-tests, to determine

whether the observed post-test difference between groups is statistically significant. Also, it illustrates the practical implications of applying Super's Life-Span, Life-Space Model in the context of Bauchi Metropolis secondary schools. The experimental group's elevated scores indicate that structured guidance grounded in life-span development and life-space principles can effectively enhance students' self-awareness, interest clarification, and alignment of personal values with potential occupational roles. In contrast, the control group's relatively low mean score of 25.86 reflects the limited effectiveness of conventional career guidance approaches, which often lack structure, theoretical grounding, or practical engagement with students' evolving self-concept and career roles. This contrast underscores the necessity of adopting theory-informed, contextually relevant interventions to improve career exploration outcomes among adolescents in Nigerian schools.

The post-test results also provide insights into the broader educational and developmental significance of the intervention. Adolescents in the experimental group, by achieving higher scores, demonstrated increased readiness to make informed career decisions, reflecting enhanced cognitive and reflective engagement with the process of career planning. This improvement is particularly meaningful in a socio-cultural context where students may face limited exposure to career information or societal pressures that restrict exploration. The data suggest that the instructional package effectively empowered students to take an active role in their career development, consistent with the principles of agency and self-concept central to Super's model.

Research Question Three

What is the differences between the male and female students on the effect of Super's Life-Span, Life-Space Model on career exploration?

Table 8: Post-Test Scores by Gender (Experimental Group)

Gender	N	Mean	Std. Deviation	Std. Error Mean
MALE	24	35.67	4.641	.947
FEMALE	25	36.76	3.745	.749

Table 8 presents the post-test scores of male and female students in the experimental group following the implementation of the instructional package based on Super's Life-Span, Life-Space Model. The data show that twenty-four (24) male students achieved a mean score of 35.67 with a standard deviation of 4.641, while twenty-five (25) female students achieved a mean score of 36.76 with a standard deviation of 3.745. The standard errors of the mean were 0.947 for males and 0.749 for females. These results provide insight into the relative performance of male and female students in response to the intervention, allowing for an examination of gender differences in the effectiveness of the model.

It shows that both male and female students in the experimental group improved significantly in their career exploration abilities following exposure to the instructional package. The mean scores of 35.67 for males and 36.76 for females indicate that, on average, students of both genders reached a high level of competence in exploring career options, clarifying personal interests, and aligning their self-concept with potential occupational paths. The small difference of 1.09 points between the female and male mean scores suggests that while females

scored slightly higher than males, the gap is modest and may not be practically significant. This finding is important, as it demonstrates that the instructional package is effective for both genders, supporting the model's universal applicability within the secondary school context.

The standard deviations reported indicate moderate variability within each gender subgroup, with males showing slightly greater spread (4.641) than females (3.745). This difference suggests that while most students benefited from the intervention, individual responses varied, reflecting the theoretical premise of Super's Life-Span, Life-Space Model that career exploration is influenced by multiple factors, including self-concept, environmental context, and individual life roles. The slightly higher variability among males may indicate that some male students were more receptive to the intervention than others, while female students showed more consistent gains. Nonetheless, both genders experienced meaningful improvement from pre-test to post-test, highlighting the overall efficacy of the model.

The standard errors of the mean, 0.947 for males and 0.749 for females, indicate that the observed means are precise estimates of the population means. This precision supports the reliability of the data and strengthens confidence in subsequent statistical comparisons between genders. Furthermore, the relatively small difference in standard errors underscores that both subgroups were similarly represented and assessed, ensuring fair comparison and minimizing the risk of sampling bias affecting the interpretation of gender differences.

From a theoretical perspective, Table 8 provides valuable insight into the gender-neutral applicability of Super's Life-Span, Life-Space Model. The model emphasizes the interaction of self-concept, life roles, and environmental influences in career development, and the post-test results suggest that this framework benefits students irrespective of gender. In the context of Bauchi Metropolis, where cultural expectations and societal norms may traditionally influence the career aspirations of male and female students differently, the findings imply that structured, theory-based interventions can mitigate such disparities by equipping all students with the tools to engage in reflective career planning.

Discussion of Findings of the Study

The study examined the effect of an instructional package based on Super's Life-Span, Life-Space Model on career exploration among secondary school students in Bauchi Metropolis. A total of one hundred students, evenly distributed by gender, were drawn from three SS2 classes across selected schools. They were randomly assigned to experimental (n = 49) and control (n = 51) groups. The study employed a pre-test, post-test quasi-experimental design, and data were analyzed using descriptive statistics and independent samples t-tests to test the research hypotheses.

The demographic analysis revealed that the sample was evenly distributed across gender, age, class, and study groups. Specifically, the gender distribution was perfectly balanced, with fifty male and fifty female students, ensuring that the study findings could reflect the experiences of both genders. Age distribution indicated that most respondents were 15 to 17 years old, with the majority (34%) aged 16 and 17 years. Class representation showed a relatively even spread across SS2A, SS2B, and SS2C, with the highest representation in SS2C (38%). Group allocation also showed near-equal distribution between experimental and control groups, which ensured baseline comparability and strengthened the internal validity of the study.

Analysis of career exploration scores revealed important trends. Pre-test scores indicated that students in both the experimental and control groups began the study with similar levels of career exploration. The experimental group had a mean of 21.88 while the control group had a mean of 21.63, with comparable standard deviations (2.766 and 2.835, respectively). The independent samples t-test for pre-test scores confirmed that there was no statistically significant difference between the groups ($t = 0.446$, $p = 0.656$). This baseline equivalence is crucial, as it established that both groups were comparable in knowledge, exposure, and readiness for career exploration prior to the intervention. It also validates the research design, allowing any post-intervention differences to be attributed to the instructional package rather than pre-existing disparities.

Post-test analysis, however, revealed substantial differences between the experimental and control groups. Students in the experimental group, who received the instructional package, demonstrated a significant increase in career exploration scores, achieving a mean of 36.22 compared to the control group mean of 25.86. The independent samples t-test confirmed that this difference was statistically significant ($t = 13.005$, $p = 0.000$), indicating a strong positive effect of the intervention. These results demonstrate that structured, theory-based guidance grounded in Super's Life-Span, Life-Space Model can significantly enhance students' capacity to explore careers, clarify personal interests, and align their self-concept with potential occupational roles. In contrast, the control group, which received conventional career guidance, showed relatively low improvement, highlighting the limitations of unstructured guidance approaches in fostering meaningful career exploration.

The study also examined gender differences in response to the instructional package. Analysis of post-test scores within the experimental group showed that male students had a mean score of 35.67, while female students had a mean score of 36.76. Although females scored slightly higher on average, the independent samples t-test revealed that this difference was not statistically significant ($t = -0.909$, $p = 0.368$). This indicates that both male and female students benefited equally from the intervention. The finding supports the gender-neutral applicability of Super's model and suggests that structured, theory-driven career guidance programs can be implemented inclusively without favoring one gender over the other. This has practical implications for educational policy, emphasizing that career development interventions can empower all students regardless of gender, fostering equitable access to career planning tools and guidance.

Descriptive statistics for the full sample further reinforced these findings. Overall, the mean pre-test score across all respondents was 21.75, which increased to 30.94 at post-test. The median and mode values also reflected substantial improvement, shifting from 21.50 and 19 at pre-test to 30.50 and 33 at post-test, respectively. The increased variance at post-test (42.804 compared to 7.785 at pre-test) suggests that while all students benefited from the intervention, the magnitude of improvement varied individually, reflecting differences in how students internalized and applied the principles of Super's Life-Span, Life-Space Model. The symmetrical distribution of post-test scores, as indicated by skewness values, implies that gains were generally consistent across the sample.

The primary objective of this study was to investigate the effect of an instructional package based on Super's Life-Span, Life-

Space Model on career exploration among secondary school students in Bauchi Metropolis. The discussion of findings is organized in relation to the research objectives, questions, and hypotheses, drawing upon the descriptive and inferential analyses presented in the previous chapter. The findings are interpreted within the theoretical framework of Super's model, the empirical context of Nigerian secondary schools, and broader career development literature.

The study first examined the pre-test career exploration scores of the experimental and control groups to establish baseline comparability. The results indicated that the experimental group had a mean pre-test score of 21.88, while the control group had a mean of 21.63. An independent samples t-test confirmed that this difference was not statistically significant ($t = 0.446$, $p = 0.656$), indicating that the two groups were equivalent in their level of career exploration prior to the intervention. This finding is significant because it validates the internal consistency and reliability of the quasi-experimental design. In experimental research, establishing baseline equivalence is essential for attributing any post-test differences to the intervention rather than pre-existing disparities (Alika, 2025).

The pre-test equivalence also aligns with the theoretical assumptions of Super's Life-Span, Life-Space Model, which recognizes that career development is a continuous process shaped by individual self-concept and environmental factors. At baseline, students in both groups demonstrated moderate levels of career exploration, suggesting limited prior exposure to structured career guidance. This supports the study's premise that conventional guidance practices in Bauchi Metropolis are often informal, inconsistent, and insufficient in fostering reflective career planning.

The core finding of the study is that the instructional package based on Super's model had a substantial positive effect on students' career exploration. Post-test results revealed that the experimental group achieved a mean score of 36.22, compared to 25.86 in the control group. The independent samples t-test confirmed that this difference was statistically significant ($t = 13.005$, $p = 0.000$), strongly supporting the effectiveness of the intervention.

This finding corroborates the theoretical proposition of Super's Life-Span, Life-Space Model, which emphasizes the integration of self-concept, life roles, and environmental interactions in the development of career identity.

The study further examined whether male and female students in the experimental group differed significantly in post-test career exploration scores. The analysis revealed that males had a mean score of 35.67 and females had a mean of 36.76. Although females scored slightly higher, the difference was not statistically significant ($t = -0.909$, $p = 0.368$). This suggests that the instructional package was equally effective for both genders.

This finding has important theoretical and practical implications. It confirms the gender-neutral applicability of Super's model, which does not assume intrinsic differences in career potential based on gender but rather emphasizes individual self-concept and role engagement. In the socio-cultural context of Bauchi Metropolis, where gender norms and societal expectations may influence educational and occupational aspirations, the equality of outcomes demonstrates that structured, theory-based guidance can mitigate disparities and provide all students with equitable opportunities for career development.

The result also aligns with international research, which suggests that when career guidance interventions are structured,

supportive, and contextually relevant, gender differences in career exploration outcomes are minimal (Otus & Onyishi, 2002). In practical terms, the finding implies that secondary schools can implement the instructional package inclusively, ensuring that both male and female students acquire the necessary skills and confidence to engage in career exploration.

The findings of this study have broader implications for career development in Bauchi Metropolis and similar contexts. First, the low pre-test scores across both groups highlight the inadequacy of conventional guidance practices, which often fail to equip students with the knowledge and tools required to make informed career explorations. Without structured interventions, students risk making arbitrary or socially pressured decisions that may not align with their abilities, interests, or labor market opportunities. This aligns with previous studies indicating that Nigerian adolescents frequently graduate secondary school without a clear career direction, contributing to unemployment and underemployment (Nwokolo & Chukwuma, 2021).

Second, the significant gains observed in the experimental group demonstrate the potential for Super's Life-Span, Life-Space Model to be adapted as a practical framework for school-based career guidance. By emphasizing self-concept, life roles, and environmental interaction, the model equips students to reflect critically on their interests, strengths, and future pathways. The intervention also fosters decision-making skills, goal-setting abilities, and awareness of the dynamic relationship between personal attributes and societal opportunities. These are essential competencies for navigating the increasingly complex and competitive labor market in Nigeria.

Third, the gender analysis reinforces the importance of inclusive program design. By demonstrating that male and female students responded equally well to the intervention, the study suggests that gender-targeted modifications are unnecessary. This is particularly relevant in regions where cultural or social norms might otherwise influence access to career development resources. Inclusive implementation of theory-driven interventions can therefore promote equity, ensuring that all students regardless of gender benefit from career guidance programs.

The findings of the study are consistent with Super's theoretical assertions that career development is a life-long process shaped by interactions among self-concept, social roles, and environmental influences (Super, 2025). The intervention's success supports the model's applicability to the adolescent stage, where exploration of occupational roles and clarification of personal attributes are central tasks. The observed variability in post-test scores, with some students improving more than others, aligns with the model's emphasis on individual differences and the cumulative effect of experiences on self-concept formation.

Empirically, the study reinforces prior research demonstrating the efficacy of structured career guidance interventions. Studies conducted in various educational contexts have found that model-based career programs improve students' occupational knowledge, self-awareness, and planning abilities (Niles & Harris-Bowlsbey, 2020; O'Reilly, 2017). The present study extends this literature to the Nigerian context, providing evidence that theoretically grounded interventions can produce significant gains even in regions where conventional guidance practices are limited or underdeveloped.

While the findings are robust, some considerations are necessary. The study

was limited to secondary school students in Bauchi Metropolis, which may affect the generalizability of the results to other regions or educational levels. Additionally, individual differences in responsiveness to the intervention reflected in the post-test score variability suggest that factors such as personal motivation, prior knowledge, and socio-cultural influences may moderate the impact of the model. Future research could explore these moderating variables to enhance understanding of how to tailor interventions for maximum effectiveness.

5. Conclusion and Recommendations

Based on the findings of this study, it can be concluded that the Super's Life-Span, Life-Space Model is an effective framework for enhancing career exploration among secondary school students in Bauchi Metropolis. The significant improvement observed in the experimental group at the post-test stage indicates that when students are exposed to structured, theory-based guidance interventions, their understanding of self, life roles, and career options is greatly improved.

The study also established that gender does not significantly influence the effectiveness of the model, suggesting that both male and female students benefit equally from the instructional package. This reinforces the inclusive nature of Super's theory, which recognizes individual differences while promoting self-concept development across life roles.

In essence, the study concludes that implementing Super's Life-Span, Life-Space Model in secondary schools can bridge the gap between abstract career guidance and practical decision-making. It provides students with a coherent structure for exploring their abilities, values, and opportunities, thereby fostering informed and purposeful career explorations essential for personal and societal development.

Recommendation

In light of the findings and limitations of this study, the following suggestions are made for future research:

1. Future studies should be conducted on larger and more diverse samples across different regions of Nigeria to enhance the generalizability of findings and determine whether the effects of Super's Life-Span, Life-Space Model are consistent across various cultural and educational contexts.
2. Researchers should consider employing a longitudinal research design to assess the long-term impact of Super's Life-Span, Life-Space Model on students' career development, decision-making, and eventual occupational choices beyond secondary school.
3. Further investigations should explore the influence of socio-economic status, parental background, and cultural values on the effectiveness of the model, as these factors may moderate students' career exploration outcomes.
4. Future studies could also compare Super's Life-Span, Life-Space Model with other career development theories, such as Holland's Vocational Personality Theory or Krumboltz's Learning Theory, to identify which frameworks are most effective in the Nigerian educational system.
5. Finally, researchers are encouraged to incorporate qualitative approaches such as interviews, focus groups, or case studies to gain deeper insights into students' personal experiences, challenges, and perceptions regarding career exploration and development

References

Abubakar, H. (2021). "The Role of Cultural Beliefs in Career Choice among Students in Northern
Nigeria". *African Journal of Educational Development*, 18(2), 112-130.
Adebayo, E. O. (2015). "Factors Influencing Career Choice Among Secondary School Students in Osun State, Nigeria". *Journal of Education and Human Development*, 4(1), 1-9.
Adegbite, J. (2021). "Factors Influencing Career Choice Among Nigerian Youth". *African Journal*
of Career Development, 12(1), 45-67.
Agbaje, R. O., & Aluede, O. (2020). Provision of guidance and counselling services in Nigerian
Secondary schools: Issues and challenges. Journal of Education and Practice, 11(9), 45–53.
Adewale, T., & Yusuf, A. (2020). The effect of parental influence on career choice among
Nigerian secondary school students. *Journal of Career Development Studies*, 15(2), 45-59.
Adebayo, T. (2021). "Challenges of Career Guidance in Nigerian Secondary Schools". *Journal of*
Educational Policy Research, 25(1), 89-107.
Adekeye, O. A., Adeusi, S. O., & Chenube, O. O. (2015). Work role salience, self-esteem and
perceived self-efficacy as predictors of career maturity of senior secondary school students. *British Journal of Education, Society & Behavioural Science, 11*(1), 1–9. https://doi.org/10.9734/BJESBS/2015/18769
Ajibade, O., & Onuoha, C. (2022). "Socioeconomic Factors and Career Decision-Making among
Nigerian Youth". *Nigerian Journal of Career Counselling*, 10(1), 78-91.
Alika, I. H. (2025). Parental and Peer Group Influence as Correlates of Career Choice in
Humanities among Secondary School Students in Edo State, Nigeria. Journal of Research in Education a nd Society.
Aliyu, M., & Ahmed, Y. (2022). "The Effect of Career Counselling in Nigerian Schools. *West*
African Journal of Career Studies, 14(3), 67-85.
Bako, K. (2020). "Career Development Policies and their Effect in Northern Nigeria".
Nigerian Journal of Educational Management, 22(4), 134-159.
Eze, I. (2021). Gender Disparities in Career Aspirations of Nigerian Secondary School Students.
African Journal of Educational Research, 25(3), 112-123.
Federal Republic of Nigeria. (2013). National Policy on Education (6th ed.). Lagos: NERDC Press.
Gottfredson, L. S. (2002). "Circumscription, Compromise, and Self-creation in Career
Development". *Journal of Counselling Psychology*, 49(2), 179-193.
Heckhausen, J., Wrosch, C., & Schulz, R. (2010). "A Motivational Theory of Life-Span
Development". *Psychological Review*, 117(2), 32-61.
Holland, J. L. (1997). Making Vocational choices: A Theory of careers. *Psychological Assessment*
Resources.
Ibrahim, A. (2016). "Sociocultural influences on educational participation in Northern Nigeria:
Implications for policy and practice". *African Journal of Educational Research and Development*, 9(2), 80–91.

Lent, R. W., Brown, S. D., & Hackett, G. (1994). *Toward a unifying social cognitive theory of*
career and academic interest, choice, and performance. Journal of Vocational Behavior, 45(1), 79–122. https://doi.org/10.1006/jvbe.1994.1027

Momoh, S. O., & Olanrewaju, I. P. (2014). Assessment of the effect of guidance services
in senior secondary schools in Jos North L.G.A, Plateau State. *Journal of Education and Practice, 5*(25), 25–31. https://www.iiste.org/Journals/index.php/JEP/article/view/15157

Muhammad, A., & Ibrahim, Y. (2023). "Career Adaptability Among Secondary School Students
in Nigeria". *West African Journal of Career Psychology*, 8(1), 55-72.

Muhammad, A. (2023). "Improving Career Guidance in Nigeria: Policy
Recommendations". *Nigerian Journal of Education and Development,* 20(3), 99-121.

Muhammad, M. D. (2017). *Influence of Nurturing Styles on Career Choice of Senior Secondary*
School Students in Kaduna State, Nigeria (Master's thesis, Ahmadu Bello University, Zaria).

Muhammad, S., & Ibrahim, M. A. (2023). Socioeconomic status and career preferences among
secondary school students in Nigeria. Nigerian Journal of Educational Psychology, 21(1), 18–34.

Murray, J. (1976). A Study to Assess Career Choice Certainty Among Community College
Students (Doctoral dissertation, University of Toronto).

O'Relily, N. B. (2017). Exploring the Influence of Career Awareness Counselling on Career
Awareness and Occupational Goals among Junior High School Students in Plateau State, Nigeria. Sapientia Foundation Journal of Education, Sciences and Gender Studies

Otu, M. S., & Onyishi, C. N. (2024). A Culturally Nuanced Exploration of Adolescent Career
Decision-Making and Mental Health Challenges.
Journal of Advanced Guidance & Counselling, 5(2).

Ogunyemi, A. (2019). "Career Counselling and its Effect in Nigerian Secondary Schools.
International Journal of Educational Studies, 14(2), 89-103.

Oyebade, S. A., Oladipo, S. E., & Adetoro, J. A. (2020). *Career guidance exposure and career*
decision-making skills among senior secondary school students in Lagos State, Nigeria. African Journal of Educational Research and Development, 13(2), 112–128.

Parsons, F. (1999). *Choosing a Vocation*. Houghton Mifflin.

Patton, W., & McMahon, M. (2014). *Career Development and Systems Theory: Connecting theory and Practice.* Rotterdam: Sense Publishers.

Savickas, M. L. (2013). "Career Construction Theory and Practice. *Career Development &*
Counselling, 3(1), 147-183.

Sara, S.S, (2004). *Relationship Between Learning Styles and Career Preferences Among Senior*
Secondary School Students in Jigawa State, Unpublished Masters Dissertation, Department of Education, Bayero University, Kano.

Super, D. E. (1990). A life-span, life-space approach to career development. In D. Brown & L.

Brooks (Eds.), Career choice and development: Applying contemporary theories to practice (2nd ed., pp. 197–261). San Francisco, CA: Jossey-Bass.

Watt, D., & Sultana, R. G. (2004). Career guidance policies in 37 countries: Contrasts and common themes. International Journal for Educational and Vocational Guidance, 4(2–3), 105–122. https://doi.org/10.1007/s10775-005-1025-y