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Development of an Automated Counselling System for Nigerian Open and Distance Learning Students' Programme Selection

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Abstract: *Choosing an academic programme or career path is often challenging for prospective students seeking admission to higher education institutions. Many rely on advice from both qualified and unqualified sources, leading to poor programme choices that result in dissatisfaction, poor performance, or dropping out. This study aims to design an Automated Counselling System (ACS) to improve prospective students' programme and career decisions in an Open and Distance Learning (ODL) institution, using the National Open University of Nigeria (NOUN) as a case study. The ACS was developed using Client Architecture and a mixed-method approach. Data was collected through questionnaires distributed via NOUN desk officers at purposefully selected study centers across Nigeria's six geopolitical zones. Of the 240 questionnaires distributed, 180 were returned. Findings indicate that the system was well received, with most users expressing satisfaction in its ability to assist them in making informed, long-term programme choices. The ACS presents an effective solution to the counselling gaps in educational institutions, offering a scalable and reliable alternative to traditional counselling methods. However, further research on how the system can help students manage academic challenges once they are admitted should be investigated. The insights from this study can be applied to other higher education institutions.*

Keywords: *Automated Counselling System, Prospective Students, ODL, Client Architecture, Programme Selection*

1. INTRODUCTION

Higher education institutions significantly influence students' academic and professional paths. Career and counselling services are vital resources that assist students in navigating their academic paths. These services, usually provided by student counsellors, consist of collaborative discussions in which students examine the significance of general education, comprehend institutional policies, and connect their academic decisions with career objectives [1]. Effective counselling enables students to make educated choices about programme selection, so improving their academic experience and future professional opportunities [2]. Nonetheless, despite the presence of career advising services, numerous prospective students encounter difficulties in choosing the most appropriate academic programme. The challenge of making definitive judgments frequently arises from insufficient pre-admission counselling, resulting in erroneous choices [3] and ensuing discontent [4]. This issue is especially troubling at Open and Distance Learning (ODL) institutions because students frequently do not have direct access to face-to-face counselling sessions. Poor programme selection results in diminished motivation, academic underachievement, course failures, elevated dropout rates, and potential mental health issues, including stress and depression [5]. These problems underscore the pressing necessity for an efficient, organised, and accessible counselling system to aid students in making informed judgments.

The intricacy of career choosing has escalated owing to the expanding variety of educational alternatives, shifting work market requirements, and growing youth perspectives on career preparation [6] [7]. Considering these issues, institutions must implement innovative strategies to assist students in the decision-making process. Aina et al., [8] suggest a framework wherein universities collaboratively generate value with students via academic education, pertinent curricula, and job development courses. For this framework to be effective, students must actively engage with the material offered by universities and match it with their interests and long-term objectives [9]. The interaction with a browser or Internet-

enabled system for counselling and information retrieval is an established concept. Kato et al.,[10] developed an online counselling system emphasising usability evaluation, illustrating initial attempts to digitise counselling services. Patel & Shah [11] developed a web portal for student counselling, aimed at facilitating student interactions within an academic setting. Fahyuni et al., [12] recently examined mobile online counselling systems designed for millennial students, suggesting mobile-based solutions as alternatives to conventional face-to-face methods.

Existing systems have primarily focused on general student populations or have not achieved full automation and contextual adaptation for Open and Distance Learning (ODL) environments, such as Nigeria's National Open University (NOUN). This study presents a context-specific, automated counselling system that specifically addresses the pre-admission programme selection process in Nigerian ODL institutions, distinguishing it from prior research. The proposed system incorporates client-server architecture alongside customised modules, including FAQ, Decision Tables, and Chat interfaces, facilitating scalable, data-driven, and individualised counselling experiences. This automated solution tackles the challenges of physical inaccessibility and insufficient pre-admission counselling commonly encountered by ODL students, providing an innovative method to enhance student satisfaction and long-term academic performance.

This study aims to design and create an Automated Counselling System specifically for students engaged in Nigerian Open and Distance Learning. This methodology aims to enhance traditional counselling methods by utilising technology, offering students a systematic, data-informed approach to programme selection. This automated technology provides students with tailored counsel that aligns with their academic interests, career goals, and job market trends, thus improving their educational experience and future professional success.The Automated Counselling System (ACS) for prospective students' programme or career selections at the National Open University of Nigeria utilising client architecture. The evaluation will assess whether prospective students attain maximum satisfaction while utilising the system to select a curriculum. This purpose will be accomplished by the subsequent objectives:

i. To examine students' perceptions of traditional counseling methods and program selection processes in Open and Distance Learning institutions.
ii. To design and develop an automated counseling system that enhances program and career recommendations for prospective students.
iii. To assess the extent to which the values embedded in the newly developed system meet user expectations and satisfaction.
iv. To evaluate the effectiveness of the system in facilitating long-term student satisfaction with their chosen programs.

The above objectives answer this research question - “How effective is an automated counseling system in enhancing programme selection and ensuring long-term satisfaction for prospective students in Open and Distance Learning institutions in Nigeria?”

1.2 A Conceptual Design of the Proposed Automated System

The figure below displays the conceptual diagram of the proposed automated counselling system.

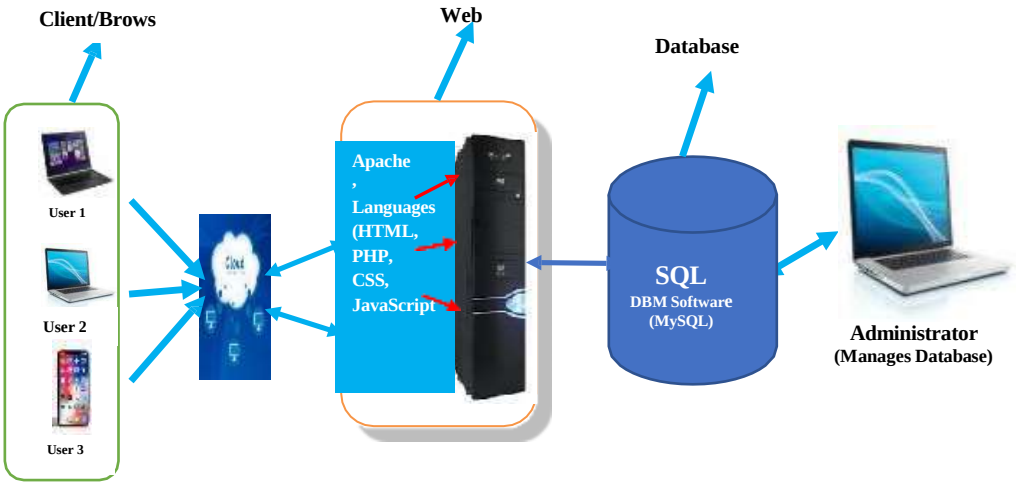

Figure 1: Conceptual diagram of NOUN automated counselling system using the client/server architecture

2. LITERATURE REVIEW

2.1 Overview of an Automated Counselling System

Due to the difficulty of obtaining quality academic programmes or career counselling, many students have entered programmes they subsequently hate, struggle with, or even drop out of, shattering their ambitions and ruining their career possibilities. A web-based proposed model for managing student decision-making and lessening the documentation for

counsellors is required to address these difficulties [13]. An automated Counselling System is a computerized method of counselling involving clients using the Internet to seek advice and answers to their queries [14].Winter & Winter [9] defined the client architecture as an electronic system composed of the Client/Browser, the Web Server, and the Database Servers. It will offer prospective students online alternatives across the country to make better choices/decisions in their program/career selections using the client technique.

The client-server is a networking computing system design that indicates a relationship between two or more computers in which the clients request and receive resources from a potent centralised server machine [15]. Web browsers (e.g. Mozilla Firefox, Opera Mini, etc.), middleware (such as Apache, a web server), and database servers (such as MySQL, PostgreSQL, and JavaScript) make up the client/server architecture of an electronic system (MySQL). A Client- Server system's ability to scale horizontally to millions of virtual computers is crucial for cloud computing. Google Apps -Gmail, Google Talk, etc. are a few examples of programmes that use this technology [16]. Khriji et al., [17], described the client-server architecture, the physical and logical components of the client-server architecture, and the implementation strategy. Ladegourdie & Kua [18], used simulation to assess the condition of client-server models and contrasted it with the seven-layer OSI model.

The findings of Adepoju & Alao [13] demonstrated that creating an online career counselling programme is feasible. Additionally, according to the third part's results, the online and face-to-face groups had a substantial and favourable mean in professional decision-making when compared to the control group. One may argue that in addition to in-person counselling, internet counselling is a useful tool for universities and other educational institutions that help students be ready for their future careers.

The 2024 study by Herath et al., [19], found that students' career path planning can be aided by experimenting with a variety of supporting technologies and strategies while using Computer-Assisted Career Guidance tools. A unique set of student- related parameters has been considered in these tools to provide individualised career decision support. It was also discovered that different educational stages employ computer-assisted career advisory tools in different ways. Moreover, [20] created and put into effect two best practices that are sequential, progressive, and interdependent to enhance and guarantee the quality of the services provided in higher education. Under its innovation and best practices umbrella, Srinivas University developed the "Srinivas Student Integrated Development Model" and "Srinivas Integrated Student Education Service Delivery Model," which aim to make higher education more student-centric and play a significant role in transforming higher education to lead other industries [20].

2.2 Academic Counselling and ODL

The distance between student and teacher is the primary characteristic of the distance learning system. In a scenario involving distant learning, the teacher is invisible. The teachers in the schools within the main institute are a long way from the students. Here, the teacher is incorporated into the meticulously crafted self-study study materials. Conversely, the academic counsellor fulfills the role of a teacher but only sometimes interacts with the students in person during counselling sessions or through comments on their submitted assignment responses. In the ODL situation, the student and the teacher are physically apart, according to [21]. Academic counselling is a significant component of the student support services provided by the Open and Distance Learning (ODL) system [22]. The ODL system's success for the learners depends on it. Distance learners' success in finishing the courses is impacted by the geographical separation of the teachers and students and sociopsychological limitations, including language, culture, motivation, insufficient skill, anxiety, etc. Therefore, when transitioning from high school to university, young people must select a program that suits them. Academic success rates are a particularly good indicator of how challenging this task is. For many years, higher education research has focused heavily on the issue of academic achievement in higher education. For prospective students selecting a university programme, dutch matching processes should be a fit test as proposed by [23].

2.3 System Value Requirements

A set of value requirements was formed to ensure that intelligence test applications satisfy users. The mobile (automated) intelligence test was expected to assist the counsellors in identifying the students' inner strengths and necessarily consulting them for better academic performance and future careers. Various users evaluated the automated intelligence test application and achieved positive results regarding its serviceability and value conditions [5]. The system's value requirements are the system's characteristics that the users benefit from. Some of the most critical expectations from the system that are evaluated are discussed below:

i. Availability/Flexibility: The automated counselling method can be available in synchronous or asynchronous mode. According to Koelen et al., [14], the services can be accessed at anytime and anywhere.

ii. Cost Efficiency: A well-considered and implemented automated counselling system can reduce the costs of handling the correspondence linked with record keeping [24].

iii. Quicker Response Time: According to Małopolski & Skoczypiec [24], a well-designed counselling system allows timely information retrieval.

iv. Accuracy: Accuracy is vital at every stage of development; it gives system users the trust they will require to rely upon a learner record system [25].

v. Client's Satisfaction: An effective automated counselling system provides the requested information quickly and without burdensome trial-and-error searching. Absolute satisfaction, which is the number one goal of the user, should be met with the developed system [1].

3. METHODOLOGY

This study used mixed-methods data collection techniques. Primary data was collected through a closed-ended questionnaire that was distributed to NOUN students in purposefully selected study centres in Nigeria's six geographical zones. The sample frame involves using a purposive sampling approach where participants was selected using a unique criteria and considerations for the justification of information to develop an integrated model [26]. The use of purposive sampling techniques was justified by the selection of only locations with sizable student populations. The desk officers who deal with potential students were given data collection instruments to distribute to students of affected faculties. Twelve (12) study centres, two from each geopolitical zone, were purposefully chosen as population samples. The centres chosen are the Northeast Zone's Bauchi and Gulak study centres, the Northwest Zone's Kano and Kagoro study centres, the North Central Zone's Jos and Kuje Prisons study centres, the Southeast Zone's Enugu and Awka study centres, the South-South Zone's Calabar and Port Harcourt study centres, and the Southwest zone's Lagos and Iwo study centres. Through the desk officers, the instrument was delivered to these centres. Twenty tools, totaling 240, were handed to each centre. One hundred and eighty complete questionnaires out of the 240 that were given to potential students were returned. Participants responded to a validation questionnaire employing a 5-point Likert to indicate how strongly they agreed, disagreed, were neutral about, agreed, or strongly disagreed with certain statements. There were two sections to the questionnaire (Sections A and B). The first section included the basic viewpoint of counselling and programme selection choice, while the second section covered the suggested system's value requirements.

The designed system was also subjected to an open evaluation concentrating on the value requirements. Twenty NOUN prospective students were randomly chosen at the Model and Wuse study centres in Abuja. After being given access to the system's four (4) modules, they were interviewed about their experiences, and their comments were noted. The supplied modules are meant to be completed by a prospective student looking for a better programme alternative or career path to choose a long-lasting and fulfilling programme.

For the design of the system, the programming or scripting languages used to develop the NOUN Automated Counselling System are PHP, HTML, Bootstrap CSS, Bootstrap, Javascript, and MySQL. The system is developed using Client Architecture. The web server used for the system is the Apache web server. The proposed model stores most of the information and applications on a isolated server. The system requests data from a server when the client needs access to a particular file or application. The server then verifies the request to ensure it comes from a device the system recognises. Once the server verifies client credentials, it downloads the information to the device [27]. This study used both descriptive and inferential statistical tools. Descriptive statistical analysis comprises gathering, interpreting, analysing, and summarising data to portray data as charts, graphs, and tables. Descriptive surveys use questionnaires or interviews to describe a population's characteristics, attitudes, and actions [28].

4. RESULTS

4.1 Perspective of Counselling and Program Choice

Table 1 below comprises responses collated from sampled participants using the Linkert scale of 1 - 5, on their perspective on counselling and programme selection.

Table 1: Viewpoint of students on conventional counselling and programme selection

S/N	Questions	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Section A (General Perception of Counselling and Programme Choice)						
1	Q1	3	4	3	70	100
2	Q2	0	0	0	90	90
3	Q3	4	5	1	80	90
4	Q4	1	2	0	109	68
5	Q5	3	6	5	101	65
Section B (Value Requirements of Proposed System)						
6	Q6	1	1	0	100	78
7	Q7	0	2	1	99	78
8	Q8	0	0	0	106	74
9	Q9	1	1	1	97	80
10	Q10	0	1	0	100	79

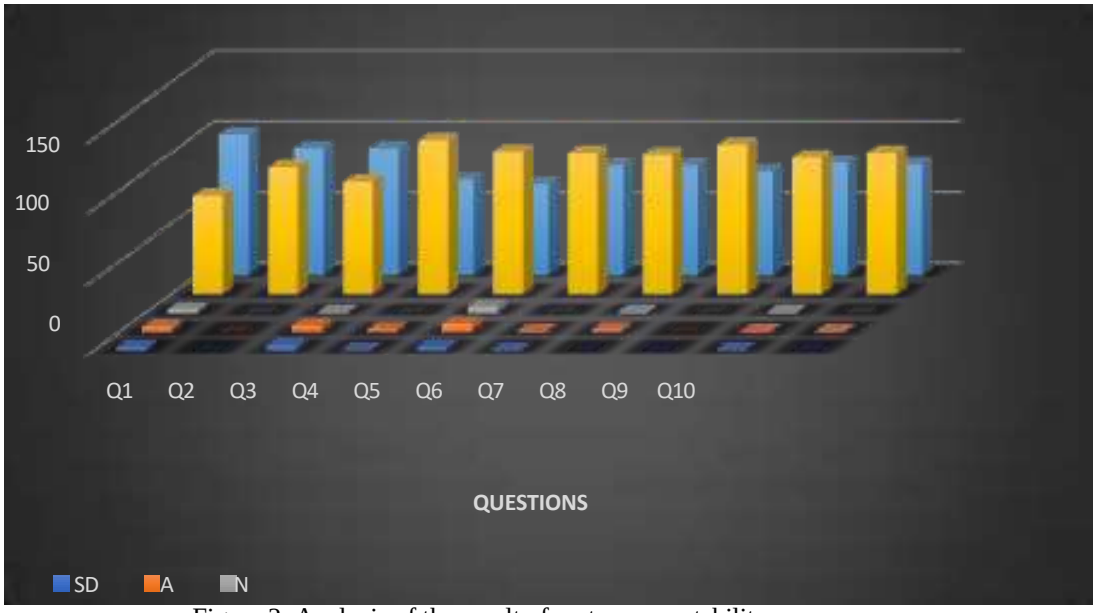

Figure 2: Analysis of the result of system acceptability

Figure 2 above provides a visual representation of the responses to the analysis of the result of the system acceptability rate in Table 1. Looking at the responses to each question, we will conclude that those who responded with 'agreed' are higher in number than the others, making it glare that most of the respondents accepted the proposed system.

4.2 Design of the Proposed Automated Counselling System

The proposed system was designed using programming languages and technologies such as PHP, HTML, Bootstrap CSS, Bootstrap, Javascript, and MySQL. The steps of interaction during the client-server request/response whenever a query is made include the following:

i. Enters http://servername.com into the browser's address bar.
ii. The browser finds servername.com's IP.
iii. Browser requests web server's home page.
iv. The web server retrieves the home page from its hard disc after receiving the request.
v. After loading the home page, the web server recognises it as a PHP file and passes it to the PHP interpreter. The PHP interpreter runs PHP. Some PHP contains MySQL statements, which the interpreter passes to MySQL.
vi. PHP receives statement results from MySQL. The web server receives PHP code and MySQL database results from the PHP interpreter.
vii. Web servers deliver pages to clients, who display them.

These processes support Adebowale [29] who defined an automated counselling system as a computerised method of counselling involving clients using the Internet to seek advice and answers to their queries. In agreement with this definition, Kirkebøen et al., [23] claims that the client architecture is an electronic system composed of the Client/Browser, the Web Server, and the Database Servers, which is in line with the aim of this research with the aid of smart phones, internet and computers to access it.

Looking at the above Figures (3 - 6) which represent some of the modules of the designed system, we can conclude that the system has four (4) Modules: The Home page, which consists of 'The Create and Login Profiles' - From the Login Profile, you have Three (3) other Modules: The Frequently Asked Questions, The Programme Decision Table and Chat with a Counsellor Modules. Technically, when a client or browser requests data from the server, the server verifies the request to ensure it comes from a recognised device. After verifying client credentials, the server downloads the information to the client [30] [27]. Reiterating, when a request is made by a prospective student, the Home page module, which also contains the login area of clients, welcomes the client and describes what the system does. The Frequently Asked Questions module contains various questions that clients may ask, and corresponding answers; the Programme Decision Table enables clients to decide after entering the intended programme's admission requirements subjects. The Chat with a Counsellor module enables client who still has reservations or wants to speak to a counsellor to connect online to the automated student's counsellor database for interaction. The prospective student goes through these modules before finally deciding on the choice of programme or career they are comfortable with.

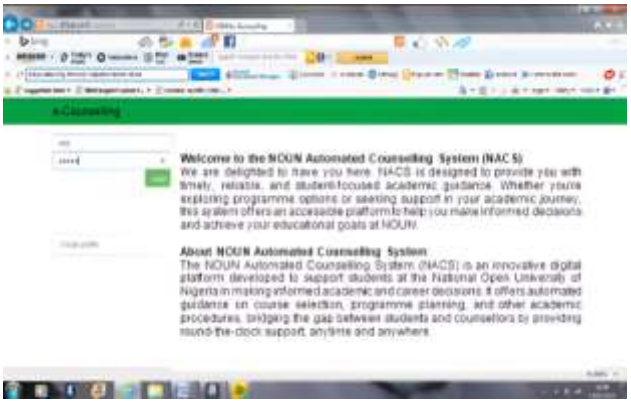

Figure 3: Home page of the NACS

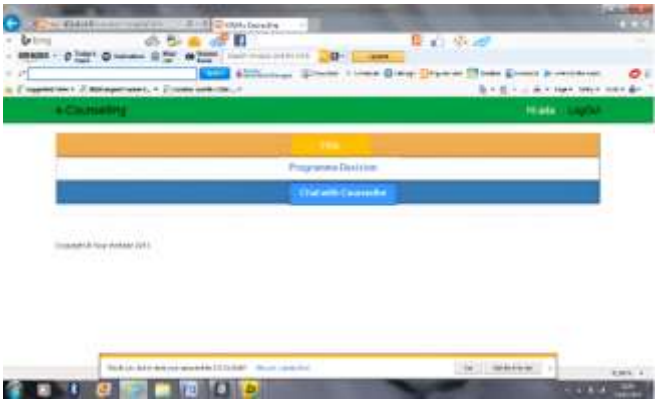

Figure 4: Display of modules page after login into NACS Site

Figure 5: Program decision table page of NACS Site

Figure 6: Chat with a councellor page – Client view

Table 2 contains data obtained from responses of randomly selected open users'/participants' (coded 'P') perspectives toward the proposed system's value requirements. The table below displays data obtained from respondents on the system's value requirements.

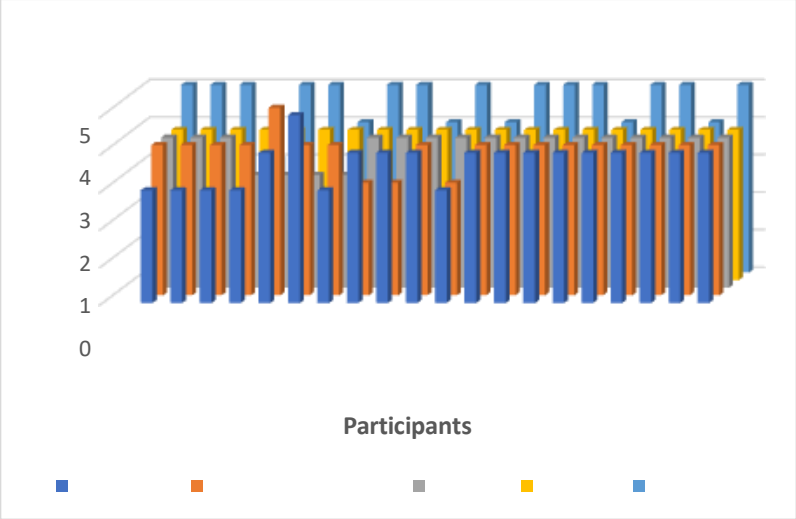

Figure 7: Responses from proposed system value

Figure 7 visually represents Table 2, summarising that the response rate on a scale of 1 to 5 indicates that satisfaction level, quick response time, flexibility, and accuracy (4-5) exhibit the highest response rates among the value requirements of the proposed system. The results indicate that the suggested automated counselling system offers substantial benefits to its users.

4.3 Assessment of Proposed System's Values

Table 2: Evaluation of system value requirements by open users' ratings

S/N	***PARTICIPANTS***	***RESPONSE RATE (1 – 5)***				
		Accessibility	*Quick Response s Time*	*Accuracy*	*Flexibility*	*Satisfaction Level*
1	P1	3	4	4	4	5
2	P2	3	4	4	4	5
3	P3	3	4	4	4	5
4	P4	3	4	3	4	3
5	P5	4	5	3	4	5
6	P6	5	4	3	4	5
7	P7	3	4	3	4	4
8	P8	4	3	4	4	5
9	P9	4	3	4	4	5
10	P10	4	4	4	4	4
11	P11	3	3	4	4	5
12	P12	4	4	4	4	4
13	P13	4	4	4	4	5
14	P14	4	4	4	4	5
15	P15	4	4	4	4	5
16	P16	4	4	4	4	4
17	P17	4	4	4	4	5
18	P18	4	4	4	4	5
19	P19	4	4	4	4	4
20	P20	4	4	4	4	5

4.4 Evaluation of Proposed System for Lasting Program and Career Choice

Table 3: Evaluation of the Proposed System for Lasting Programme and Career Choice

Section B: ***Value requirements of the proposed system***						
Users	*Accessibility*	*Quick Responses*	*Accuracy*	*Flexibility*	*Satisfaction Level*	
P1		√	√		√	
P2		√		√	√	
P3	√		√			
P4		√			√	
P5	√			√	√	
Total	**2**	**3**	**2**	**2**	**4**	

Figure 8 displays extracted data collected from respondents on satisfaction rates on different value requirements of the system.

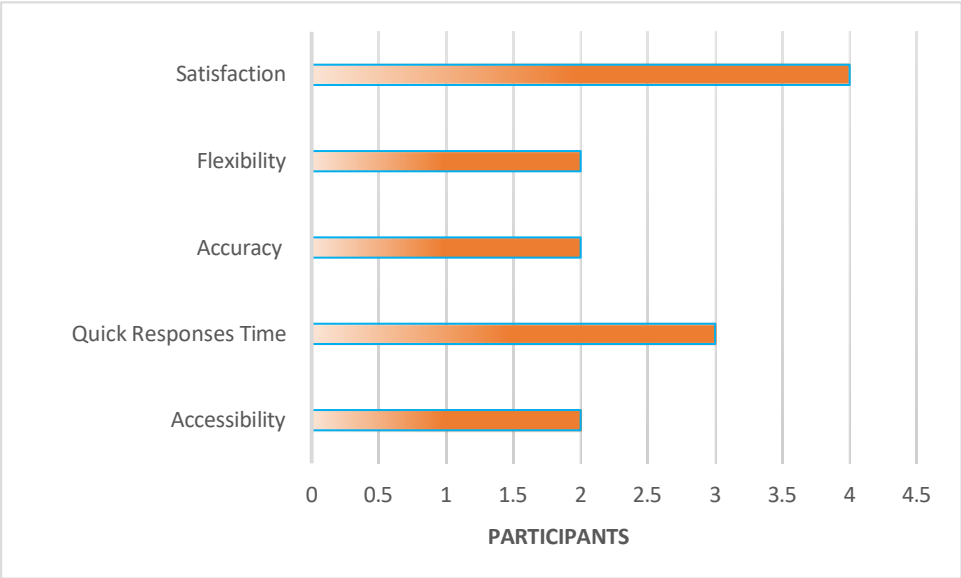

Figure 8: Rate of assessment of value requirements

Figure 8 is a diagrammatic version of Table 3; it summarised that satisfaction level among the value needs wins the greatest replies from the open user. This result implies that the users obtained lasting satisfaction from program choices made utilising the automated counselling method.

5. DISCUSSION

As shown in Table 1 above, analysis of the proposed system acceptability using the Likert scale of 1 – 5 for the 180 sampled population to identify user's responses ("Strongly Disagree", "Disagree", "Neutral", "Agree", and "Strongly Agree") and focusing on randomly picked questions 1-5 of Section A and questions 6-10 of section B of the questionnaires. The result revealed that, on a Likert scale of 1 to 5, "Strongly Disagree," "Disagree," and "Neutral" responses ranged from 0 to 3 points, while "Agree" and "Strongly agree" responses ranged from 4 to 5, indicating that majority of the respondents have a good perception concerning open and distance learning programme, and also accept the value that its gives to the general populace. This claim is supported by [5], who said that various users evaluated the automated intelligence test application and achieved positive results regarding its usability and value requirements. This claim substantiates this study's objectives.

Table 2 consists of twenty open users who were randomly selected from NOUN students to assess the proposed system's values. The users of the system are coded 'P' for ease of identification, and their responses were respectively recorded. Analysis from the above table revealed that all the responses had a scoring range of 3 to 5, indicating that the participants were satisfied with the system's use, adaptability, speed of response, accuracy, and level of satisfaction. However, because participant satisfaction is what we are most interested in, we conclude that most participants scored satisfaction with a high rating of 4 to 5, which means that maximum satisfaction was derived after interacting with the new system. This outcome corroborates the main aim of this study.

Focusing on Section B of the research instrument as shown in Table 3, participants/users of the system were randomly taken as strata of 1 – 5 of the open users, and analysis on the system's value was done, paying more attention to the satisfaction level of participants. The analysis revealed that the total responses of each (coded 1) for accessibility, accuracy, and flexibility is 2 respectively while quick response time and satisfaction level are 3 and 4 respectively. This result shows that most of the users of the system are very satisfied with the value of making the right decision about the programme they selected. This statement again agrees with the objective of this research. Furthermore, it reveals that while 90% strongly agreed that the system provided fulfilling and maximum satisfaction in choosing their programme/career path, only 10% of respondents agreed with the system satisfaction rate. In summarising the results, we found that while the users gave accessibility, speed of response, accuracy, and flexibility levels ratings of 60 to 75 percent, the satisfaction level received a significantly higher rating of 90 percent, indicating that the participants/students received the most satisfaction from the proposed system in terms of selecting the best programme or career. Combining the analyses of all the tables, we can conclude that the proposed system was significantly accepted and gave its users the highest level of satisfaction, which is the overall goal of this research [5].

6. CONCLUSION

An automated counseling system was built to solve prospective students' challenges of making satisfactory and lasting programme selection decisions. According to real system users who were sampled for this study, the system design gave them access to alternative online counseling services that are readily available, user-friendly, interactive, quick respond,

affordable, dependable, and satisfactory in assisting them in making better and lasting choices or decisions in their programme/career selections. From the findings of this research, all analyses have shown that the proposed system designis broadly acceptable to its users. Also, the proposed model gave potential students significant satisfaction in making a lasting and fulfilling long-term decision in programme/career selection.

Higher levels of student happiness and academic achievement in the ODL programme can be attained by optimizing client architecture in automated counseling systems, which can help with more informed programme choices. Subsequent investigations in this field may examine the enduring efficacy of computerized counselling systems on students' program selection practices, academic achievements, and professional consequences. Furthermore, research might examine how different client architecture characteristics affect different student populations (such as adult learners and international students) and pinpoint the most effective ways to create inclusive and fair counselling environments.

Based on the results of this study, the following recommendations are proffered; 1) consideration should be given to a follow-up approach that will assist prospective students in overcoming academic obstacles once they are admitted to postsecondary educational institutions; 2) to increase students' interest and involvement in the counselling process, interactive components, multimedia resources; 3) and captivating material forms (such as films, quizzes, and interactive simulations) should be integrated and consideration should be made to integrate features in the automated counselling system for those with special needs or disabilities for inclusivity and equity.

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