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Work Systems' Design Strategies Required for Effective be Performance of Students in Students Industrial Work Experience Scheme in Technology Education Programme in Universities in Rivers State

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Abstract: *The study explored Work Systems' Design Strategies required for effective performance of students in students industrial work experience scheme in Technology Education Programme in Universities in Rivers State. Specifically the study determined the human resource strategies, organizational design strategies, tools and technology design strategies, tasks design strategies and environmental design strategies required for effective performance of students in students industrial work experience scheme in Technology Education Programme in Universities in Rivers State. Five objectives, research questions and hypotheses guided the study. This study would adopt a descriptive survey research design. The population of the study was 120 respondents, comprising 60 Lecturers and 60 industrial supervisors in two Universities and industries in Rivers State. The study was a census as the entire population was studied. The instrument for data collection was a structured questionnaire titled "Work Systems' Design Strategies Questionnaire". The instrument was structured on five point likert type rating scale of Strongly Agree (SA), Agree (A), Undecided (U), Disagree (D) and Strongly agree (SD). A corresponding numerical value of 5, 4,3,2 and 1 was assigned to the response scale for each item as represented below with real limits. The instrument was subjected to face-validation by three experts and had .76 reliability index. Findings of the study showed that human resource strategies are required for effective performance of students in students industrial work experience scheme in Technology Education Programme in Universities in Rivers State. Findings of the study showed that organizational design strategies are required for effective performance of students in students industrial work experience scheme in Technology Education Programme in Universities in Rivers State. Findings of the study showed that tools and technology design strategies are required for effective performance of students in students industrial work experience scheme in Technology Education Programme in Universities in Rivers State. It was recommended that institutions should create a detailed framework for tasks and projects that clearly defines goals, milestones, and deliverables. This structure helps students understand their responsibilities and expectations, improving focus and performance. Tasks should be designed to challenge students while aligning with their educational objectives, providing opportunities to apply theoretical knowledge in practical settings.*

Keyword: *Work Systems' Design, Performance and Students Industrial Work Experience Scheme*

Introduction

National development and progress are intrinsically linked to the education of a nation's citizenry. For nations like Nigeria, education remains a cornerstone for growth and technological advancement (Chukwu, 2020). Technology Education, which encompasses the acquisition of technical skills and knowledge, is vital for preparing individuals to drive technological and economic development (Adeogun, 2007). This field focuses on equipping individuals with the capabilities to facilitate and implement technological advancements essential for economic and social transformation (Ogbuanya, 2010).

According to the Federal Republic of Nigeria (FRN, 2013), Technology Education involves the study of technologies and related sciences, with an emphasis on acquiring practical skills necessary for various occupations in the economic and social sectors. Universities play a pivotal role in this educational framework, serving as centers for high-level manpower development. However, recent studies suggest that graduates from Technology Education programs often lack the employability skills needed in the labor market (Oresanye et al., 2014; Ismail & Mohammed, 2015).

The philosophy and objectives of Technology Education programs, as outlined in the Benchmark Minimum Academic Standard (BMAS), aim to prepare students for real-world applications of their theoretical knowledge. For instance, the BMAS includes objectives such as understanding the maintenance of industrial materials, tools, and machinery. To achieve these goals, Nigerian universities have been granted some autonomy in curriculum design while adhering to minimum standards set by the National Universities Commission (FGN, 2011).

As part of their training, students are required to complete a six-month Industrial Training, also known as the Students' Industrial Work Experience Scheme (SIWES). This practical component is intended to bridge the gap between academic learning and industry practice, exposing students to real-world work environments and equipment that are often unavailable in academic settings.

Despite the intentions behind SIWES, the program faces challenges. Increasing numbers of students and institutions have placed significant pressure on available industrial placements, leading to situations where students are placed in environments that do not align with their educational objectives (Isichei & Ayandele, 2017). Work Systems Design, which emphasizes job design and its impact on performance, has emerged as a crucial factor in addressing these issues. Slack, Chambers, and Johnson (2007) describe job design as the process of aligning individual roles, work environments, and technology to meet organizational goals effectively.

Effective job design not only addresses structural and operational aspects but also considers the human relations perspective, which includes employee well-being and performance. Rathnakar (2012) argues that involving SIWES students in the design of their job roles and expectations can improve their performance and integration into the workplace.

In modern organizations, Human Resource Management Systems (HRMS) play a critical role in managing talent and improving efficiency. Rafidah and Dewi (2020) highlight that HRMS systems are essential for recruiting and cultivating talent, enhancing organizational competitiveness. Gao (2020) emphasizes that a well-designed HRMS can significantly boost production capacity and employee morale, thereby improving organizational resilience.

Organizational design, encompassing the alignment of structures, processes, and rewards with business strategy, has a profound impact on performance (Doty et al., 1993). Van de Ven et al. (2013) and Levitt (2012) suggest that future research should focus on designing organizations to adapt to new challenges and contexts. Effective organizational design requires a balance between technological needs and human resource capabilities, ensuring that technology serves to enhance rather than stress employees (Milkovich & Wigdor, 2001).

Overall, the design of jobs and work systems must consider the skills, abilities, and well-being of employees, including SIWES students. Addressing these factors is crucial for improving performance and achieving the desired outcomes of technology education programs.

Statement of The Problem

Employees in every organization want to draw fulfilments from their jobs and every human resource managers/management wants the employees to be fulfilled being the most important resources of the organization but managers for ages have been struggling on how to make them get the fulfilment (Magaji, 2014). Globalization has created many challenges for multinational and local organizations such as cost of production that is on the increase day-by-day due to universal factors such as world recession, resource limitation, information technology and trends that have affected the way work is done and also changed the face of competition among organizations. The problem of job design stemmed from the fact that in today's competitive environment, organizations globally want to maximize the potential of their human resources to stay ahead of the aggressive competition in the middle of the quest (Nanle, 2015). The problems of boredom and job dissatisfaction which consequently result in employee's low productivity, absenteeism and lateness, work stress, delay in administrative performance, psychological breakdown and eventually withdrawal of services are common decimal in most organizations. One possible reason for this development is that employees in these organizations view their jobs as dead ends and therefore have no pride in their jobs (Parker et al., 2017). To prevent losing such valuable workforce to competitors as a result of boredom and job dissatisfaction, Achieng et al. (2014) stated that job design and redesign could be an excellent means. Job design and employee's attitude towards job design has become an issue of great concern in the recent years among many organization but it has been rarely studied in academic literature in developing countries and there is a lack of awareness about its effects and its antecedent. Therefore, this study was conducted to examine Work Systems' Design Strategies required for effective performance of students in students industrial work experience scheme in Technology Education Programme in Universities in Rivers State.

Aim and Objectives of the Study

The aim of the study is to explore Work Systems' Design Strategies required for effective performance of students in students industrial work experience scheme in Technology Education Programme in Universities in Rivers State. Specifically the study determined the following:

1. Human resource strategies required for effective performance of students in students industrial work experience scheme in Technology Education Programme in Universities in Rivers State.
2. organizational design strategies required for effective performance of students in students industrial work experience scheme in Technology Education Programme in Universities in Rivers State.
3. Tools and technology design strategies required for effective performance of students in students industrial work experience scheme in Technology Education Programme in Universities in Rivers State.

Research Questions

The following research questions were formulated to guide the study:

1. What are the human resource strategies required for effective performance of students in students industrial work experience scheme in Technology Education Programme in Universities in Rivers State.
2. What are the organizational design strategies required for effective performance of students in students industrial work experience scheme in Technology Education Programme in Universities in Rivers State.
3. What are the tools and technology design strategies required for effective performance of students in students industrial work experience scheme in Technology Education Programme in Universities in Rivers State.

Hypotheses

The following hypotheses will guide the study and will be tested at .05 level of significance:

HO_1 There is no significant difference between the mean responses of Lecturers and industrial supervisors on the human resource strategies required for effective performance of students in students industrial work experience scheme in Technology Education Programme in Universities in Rivers State.

HO_2 There is no significant difference between the mean responses of Lecturers and industrial supervisors on the organizational design strategies required for effective performance of students in students industrial work experience scheme in Technology Education Programme in Universities in Rivers State.

HO_3 There is no significant difference between the mean responses of Lecturers and industrial supervisors on the tools and technology design strategies required for effective performance of students in students industrial work experience scheme in Technology Education Programme in Universities in Rivers State.

METHODOLOGY

This study adopted a descriptive survey research design. Nworgu (2015) explained that descriptive survey research design deals with studies which aim at collecting data through questionnaire or interview and describing the data in a systematic manner that interpret the characteristics, features, and facts about a given population. Therefore , the design is relevant to the study since the sample of the Lecturers in Universities and industrial supervisors.

The population of the study was 120 respondents, comprising 60 Lecturers and 60 industrial supervisors in two Universities and industries in Rivers State (Field Survey, 2024). The study was a census as the entire population was studied. This is in consonance with Maduabum (2007) who stated that, a survey in which the entire population is studied is referred to as census. The choice of census is due to the relatively small size of the population.

The instrument for data collection was a structured questionnaire titled “Work Systems’ Design Strategies Questionnaire”. The instrument contains seven sections A-E. The instrument was structured on five point likert type rating scale of Strongly Agree (SA), Agree (A), Undecided (U), Disagree (D) and Strongly agree (SD). A corresponding numerical value of 5, 4,3,2 and 1 was assigned to the response scale for each item as represented below with real limits.

The instrument was subjected to face-validation by three experts and had .76 reliability index. Data collected from the respondents were analyzed using mean and standard deviation to answer the five research questions and t-test statistics was used to test the five null hypotheses at 0.05 level of significance. The decision for hypothesis was; if the calculated value of t (t-cal) is less than or equal to the critical value of (t-crit), accept the null hypothesis, otherwise rejected null hypothesis. The computation of the mean, standard deviation and t-test was carried out with statistical package for social sciences (SPSS).

RESULTS

Research Question 1: What are the human resource strategies required for effective performance of students in students industrial work experience scheme in Technology Education Programme in Universities in Rivers State.

Table 1: Mean and Standard Deviation on human resource strategies required for effective performance of students in students industrial work experience scheme

S/NO	human resource strategies required for effective performance of students in students industrial work experience scheme	Lecturers X	SD	RMK	Supervisors X	SD	RMK
1	Implement a comprehensive onboarding process to familiarize students with organizational culture, expectations, and their specific roles	3.57	.692	SA	3.81	1.039	A
2	State clear, measurable objectives for students to achieve during their industrial work experience to guide their efforts and performance	3.56	.732	SA	4.11	.859	A
3	Schedule periodic evaluations to assess students' progress, provide feedback, and address any issues or challenges they may face.	4.28	.750	A	4.35	.719	A
4	Assign experienced mentors to guide students, offer career advice, and help them navigate their roles within the organization.	4.93	1.004	A	3.95	.932	A
5	Implement mechanisms for continuous feedback from both supervisors and peers to help students understand their strengths and areas for improvement.	4.16	.941	A	4.42	.844	A
6	Provide targeted training sessions to equip students with relevant skills and knowledge necessary for their tasks and future careers.	4.95	.875	A	4.09	.860	A
7	Ensure that the goals set for students align with their academic objectives and career aspirations to enhance engagement and motivation.	4.25	.931	A	4.32	.736	A
8	Create a positive and inclusive work environment that encourages students to ask questions, seek help, and collaborate with team members.	4.99	1.088	A	4.31	.790	A
9	Conduct regular check-ins between students and their supervisors to discuss progress, provide guidance, and resolve any issues promptly.	4.05	.990	A	4.42	.625	A
	Grand Mean	4.31	0.88	A	4.19	0.83	**A**

Data in Table 1 revealed that Lecturers had a mean range of 3.56-4.99 and standard deviation range of 0.69- 1.08. While the Supervisors had a mean range of 3.81-4.42 and standard deviation range of 0.71-1.04. The mean shows that the respondents agreed that

human resource strategies are required for effective performance of students in students industrial work experience scheme in Technology Education Programme in Universities in Rivers State. The standard deviation shows the homogeneity of the respondents.

Research Question 2: What are the organizational design strategies required for effective performance of students in students industrial work experience scheme in Technology Education Programme in Universities in Rivers State.

Table 2: Mean and Standard Deviation on organizational design strategies required for effective performance of students in students industrial work experience scheme

S/NO	organizational design strategies required for effective performance of students in students industrial work experience scheme	Lecturers X	SD	RMK	Supervisors X	SD	RMK
1	Establish a well-defined organizational structure with clear roles and responsibilities to help students understand their position and reporting lines	4.23	.834	A	4.07	.838	A
2	Clearly outline the specific tasks and responsibilities assigned to students to ensure they know what is expected of them	4.40	.821	A	4.09	.808	A
3	Create robust communication channels to facilitate information flow between students and their supervisors or team members	4.09	.722	A	4.04	.947	A
4	Ensure that students are integrated into relevant teams or departments to gain practical experience and contribute meaningfully to projects	4.18	.658	A	4.19	.766	A
5	Implement a system for delegating tasks that allows students to work on projects that match their skills and learning objectives	4.05	.924	A	4.12	.982	A
6	Design workflows and provide access to necessary resources, tools, and technologies to enable students to perform their tasks efficiently	4.19	.953	A	4.39	.774	A
7	Ensure that supervisors are trained to provide adequate guidance, support, and mentorship to students throughout their placement	3.99	.881	A	4.19	.860	A
8	Schedule regular team or departmental meetings that students can attend to understand project updates, team dynamics, and organizational goals	3.95	.990	A	4.26	.856	A

9	Organize students' work around specific projects or initiatives that offer real-world challenges and learning opportunities	3.98	1.03	A	4.32	.776	SA
10	Design training programs tailored to students' needs to bridge any gaps in skills or knowledge relevant to their work experience	4.19	1.04	A	4.21	.725	A
	Grand Mean	**4.13**	**0.89**	**A**	**4.19**	**0.83**	**A**

Data in Table 2 revealed that Lecturers had a mean range of 3.98-4.40 and standard deviation range of 0.65 - 1.04. While the Supervisors had a mean range of 4.40-4.39and standard deviation range of 0.72 - 0.94. The mean shows that the respondents agreed that organizational design strategies are required for effective performance of students in students industrial work experience scheme in Technology Education Programme in Universities in Rivers State. The standard deviation shows the homogeneity of the respondents.

Research Question 3: What are the tools and technology design strategies required for effective performance of students in students industrial work experience scheme in Technology Education Programme in Universities in Rivers State.

Table 3: Mean and Standard Deviation on tools and technology design strategies required for effective performance of students in students industrial work experience scheme

		Lecturers			**Supervisors**		
S/NO	**Tools and technology design strategies required for effective performance of students in students industrial work experience scheme**	**X**	**SD**	**RMK**	**X**	**SD**	**RMK**
1	Develop and implement intuitive software platforms that facilitate ease of use, allowing students to quickly adapt and focus on their tasks rather than struggling with complex interfaces	4.23	.881	A	4.34	.797	A
2	Incorporate collaboration tools such as project management software, communication platforms (e.g., Slack, Microsoft Teams), and shared document systems (e.g., Google Workspace) to enhance teamwork and information sharing.	4.44	.926	A	4.16	.902	A
3	Utilize virtual simulation and modeling tools relevant to the industry to provide students with hands-on experience and practical insights without the need for physical equipment	4.11	.858	A	3.70	1.059	A

4	Implement performance tracking and feedback systems that allow students to monitor their progress, receive constructive feedback, and set personal and professional development goals	4.26	.897	A	3.86	1.025	A
5	Ensure students have access to industry-standard software and tools used in their field of study, such as CAD software for engineering or design tools for graphic arts, to align their skills with industry expectations	4.09	.989	A	4.17	.891	A
6	Develop comprehensive training modules and onboarding programs to familiarize students with the tools and technologies they will be using, including tutorials, user guides, and hands-on practice sessions	4.18	.889	A	4.25	.830	A
7	Provide access to technical support and helpdesks to assist students with troubleshooting issues, ensuring minimal downtime and continuous productivity	3.97	.954	A	4.26	.809	A
8	Leverage cloud-based resources and storage solutions to facilitate easy access to data, documents, and collaborative projects from anywhere, enhancing flexibility and efficiency	4.04	1.017	A	4.32	.827	A
9	Integrate data analytics tools that enable students to analyze project data, assess performance metrics, and generate reports, helping them develop critical analytical and problem-solving skills	3.88	.880	A	4.02	.979	A
10	Establish mechanisms for regular feedback and continuous improvement based on student performance and experiences	3.61	0.99	A	4.02	1.06	A
	Grand Mean	4.08	0.93	A	4.11	0.92	A

Data in Table 3 revealed that Lecturers had a mean range of 3.61-4.44and standard deviation range of 0.88 - 1.02. While the Supervisors had a mean range of 3.70-4.34 and standard deviation range of 0.79 - 1.06. The mean shows that the respondents agreed that tools and technology design strategies are required for effective performance of students in students industrial work experience scheme in Technology Education Programme in Universities in Rivers State. The standard deviation shows the homogeneity of the respondents.

Hypotheses

HO_1 There is no significant difference between the mean responses of Lecturers and industrial supervisors on the human resource strategies required for effective performance of students in students industrial work experience scheme in Technology Education Programme in Universities in Rivers State.

Table 6: t-test analysis on human resource strategies required for effective performance of students in students industrial work experience scheme

Respondents	N	X	SD	α	DF	t-Cal	t-Crit	RMK
Lecturers	60	4.31	0.88					
				0.05	58	1.22	1.96	No Sig
Supervisors	60	4.19	0.83					

Result in Table 6 revealed that t-cal (1.22) is less than t-crit (1.96) which indicates that the hypothesis stated was accepted. Therefore there is no significant difference between the mean responses of Lecturers and industrial supervisors on the human resource strategies required for effective performance of students in students industrial work experience scheme in Technology Education Programme in Universities in Rivers State.

HO_2 There is no significant difference between the mean responses of Lecturers and industrial supervisors on the organizational design strategies required for effective performance of students in students industrial work experience scheme in Technology Education Programme in Universities in Rivers State.

Table 7: t-test analysis on organizational design strategies required for effective performance of students in students industrial work experience scheme

Respondents	N	X	SD	α	DF	t-Cal	t-Crit	RMK
Lecturers	60	4.12	0.85					
				0.05	58	1.23	1.69	No Sig
Supervisors	60	4.19	0.83					

Result in Table 7 revealed that t-cal (1.32) is less than t-crit (1.69) which indicates that the hypothesis stated was accepted. Therefore there is no significant difference between the mean responses of Lecturers and industrial supervisors on the organizational design strategies required for effective performance of students in students industrial work experience scheme in Technology Education Programme in Universities in Rivers State.

HO_3 There is no significant difference between the mean responses of Lecturers and industrial supervisors on the tools and technology design strategies required for effective performance of students in students industrial work experience scheme in Technology Education Programme in Universities in Rivers State.

Table 8: t-test analysis on tools and technology design strategies required for effective performance of students in students industrial work experience scheme.

Respondents		$\bar{N}$	X	SD	α	DF	t-Cal	t-Crit	RMK
Lecturers	60	4.08	0.93						
				0.05		58	1.21	1.96	No Sig
Supervisors	60	4.11	0.92						

Result in Table 8 revealed that t-cal (1.21) is less than t-crit (1.96) which indicates that the hypothesis stated was accepted. Therefore there is no significant difference between the mean responses of Lecturers and industrial supervisors on the tools and technology design strategies required for effective performance of students in students industrial work experience scheme in Technology Education Programme in Universities in Rivers State.

Discussion of Findings

Findings of the study showed that human resource strategies are required for effective performance of students in students industrial work experience scheme in Technology Education Programme in Universities in Rivers State. The finding of the study is in agreement with Green et al. (2019) who stated that a well-organized orientation program is crucial for acclimating students to the industrial environment. This includes detailed briefings on company culture, job expectations, and safety protocols. Green et al. (2019), effective onboarding increases students' confidence and readiness, thereby improving their performance and integration into the workplace Establishing clear communication channels between students, academic institutions, and industrial supervisors is essential. Regular feedback sessions and progress reports help in addressing challenges promptly and align students' efforts with organizational goals. According to Johnson and Smith (2021), frequent communication and feedback mechanisms enhance students' engagement and productivity.

Findings of the study showed that organizational design strategies are required for effective performance of students in students industrial work experience scheme in Technology Education Programme in Universities in Rivers State. The finding of the study is in agreement with Daft, (2018) who explained that effective organizational design is crucial for optimizing student performance in Student Industrial Work Experience Schemes (SIWES) within Technology Education Programs. A well-structured organization, with clearly defined roles and responsibilities, helps students understand their tasks and expectations, thereby reducing ambiguity and enhancing focus (Daft, 2018). Additionally, a supportive work environment that provides necessary resources and fosters a culture of learning is essential for student engagement and productivity (Amabile, 1996). Aligning organizational practices with academic objectives ensures that the work experience is relevant to students' educational goals, thereby bridging the gap between theory and practice (Kolb, 1984). Furthermore, implementing effective feedback mechanisms allows for continuous improvement and helps students refine their skills, which is vital for their overall development (Kluger & DeNisi, 1996). By integrating these

elements, organizations can significantly enhance the effectiveness of SIWES and contribute to students' professional growth.

Findings of the study showed that tools and technology design strategies are required for effective performance of students in students industrial work experience scheme in Technology Education Programme in Universities in Rivers State. The standard deviation shows the homogeneity of the respondents. The finding of the study is in agreement with Brown and Adams, (2020) who asserted that effective performance in Student Industrial Work Experience Schemes (SIWES) within Technology Education Programs can be significantly enhanced through strategic tools and technology design. Integrating advanced tools and technologies relevant to the industry ensures that students gain hands-on experience with current practices and standards, bridging the gap between academic knowledge and real-world application (Brown & Adams, 2020). Furthermore, employing user-friendly and adaptive technologies facilitates a more engaging and productive learning environment, allowing students to focus on skill development rather than struggling with outdated or complex systems (Mayer, 2019). Additionally, incorporating simulation and virtual reality tools can provide students with practical experience in a controlled setting, which has been shown to improve learning outcomes and problem-solving skills (Harris & Rea, 2021). By leveraging these design strategies, educational institutions can optimize the effectiveness of SIWES and better prepare students for their professional careers.

Conclusion

In conclusion, effective work systems' design strategies are pivotal for enhancing student performance in Student Industrial Work Experience Schemes (SIWES) within Technology Education Programs. By implementing well-structured work systems that include clear task assignments, supportive environments, and access to relevant tools and technologies, educational institutions can significantly improve students' learning experiences and practical skills (Kolb, 1984; Brown & Adams, 2020). Strategic design of work systems—encompassing structured workflows, effective feedback mechanisms, and alignment with academic objectives—ensures that students are better prepared for real-world challenges and can integrate theoretical knowledge with hands-on practice. Ultimately, these strategies foster a productive and engaging industrial placement, promoting professional growth and readiness for future careers.

Recommendations

Based on the findings of the study, the following recommendations were made

1. **Develop Structured Task Frameworks**: Create a detailed framework for tasks and projects that clearly defines goals, milestones, and deliverables. This structure helps students understand their responsibilities and expectations, improving focus and performance. Tasks should be designed to challenge students while aligning with their educational objectives, providing opportunities to apply theoretical knowledge in practical settings.
2. **Implement Comprehensive Onboarding and Training Programs**: Design and execute thorough onboarding and training programs that introduce students to the

work systems, tools, and technologies they will be using. This initial training should cover the use of industry-standard equipment, software, and workflows, ensuring students are well-prepared and confident in their roles.

3. **Foster a Collaborative Work Environment**: Create a work environment that encourages collaboration and communication among students, mentors, and industry professionals. Provide opportunities for team projects and group interactions, which can enhance learning and problem-solving skills. A supportive and interactive environment promotes engagement and helps students integrate more effectively into the workplace.

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