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Research Article

Effect Of A Structured Health Education Program On Secondary School Students' Knowledge Of Risky-Sexual-Behaviors In Warri, Delta State Nigeria

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ABSTRACT

Adolescents are at increased risk of engaging in risky sexual behaviours, due to limited knowledge of their consequences. This study evaluated the effectiveness of the Universal Design for Learning (UDL), a student-centred approach, compared to the lecture method, a teacher-centred approach, in improving adolescents' knowledge of risky sexual behaviours. A controlled quasi-experimental design was employed in two selected secondary schools in Warri, Delta State, Nigeria. Ekpan Secondary School was exposed to the lecture method, while Ugbomro Secondary School received UDL tutelage. A total of 558 students (279 in each group) were recruited through simple random sampling. Data were collected using a self-structured questionnaire on "Knowledge of Risky Sexual Behaviour and Consequences", administered as a self-report questionnaire. Descriptive statistics (mean, standard deviation, frequency, percentage) and inferential statistics (chi-squared and Odd Ratio) were used to analyze the data at a significance level of $p < 0.05$. Results showed that before the intervention, both groups demonstrated similar levels of knowledge ($p = 0.552$). Post-intervention, the UDL group demonstrated significantly greater improvement in knowledge of risky sexual behaviours compared to the Lecture group (97.9 vs. 91.0%, $\chi^2 = 12.33$, $p = 0.001$). The UDL approach improved knowledge of risky sexual behaviours 8 times post-intervention ($OR = 8.52$, $95\%CI = 3.57-20.35$) compared to the non-significant change in the lecture group. In conclusion, the UDL approach significantly improved knowledge of risky sexual behaviours compared to the lecture method in enhancing adolescents' knowledge of risky sexual behaviours. Nurse educators, teachers, and policymakers should integrate UDL-based teaching strategies into sexual health education programs to improve knowledge outcomes among adolescents.

Keywords: Adolescents, Lecture method, Nigeria, Nurse educators, Risky sexual behaviours, Sexual health education, Student-centred approach

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INTRODUCTION

Risky sexual behaviors among adolescents have emerged as a significant public health concern globally, with far-reaching consequences for both individual and societal well-being (Ene-Bongilli & Peter-Kio, 2021). Efrati et al. (2024) noted that the behaviours which include early initiation of sexual activity, unprotected sex, and multiple sexual partners, are strongly associated with unintended pregnancies, sexually transmitted infections (STIs), and human immunodeficiency virus (HIV) transmission. Adolescents in developing countries, including Nigeria, are particularly vulnerable due to limited access to comprehensive sexual health education, cultural taboos surrounding discussions of sexuality, and inadequate healthcare services tailored to their needs (Ene-Bongilli & Peter-Kio, 2021; Osadolor et al., 2022).

Nigeria, with its high prevalence of HIV/AIDS and other STIs, faces unique challenges in addressing adolescent sexual health (Badejo et al., 2024). According to Olofinbiyi (2024), a significant proportion of Nigerian adolescents engage in risky sexual behaviors, often due to a lack of accurate knowledge and awareness. This situation is further compounded by societal stigma, economic hardships, and peer pressure, all of which contribute to an environment where misinformation and risky behaviors thrive (Osayi et al., 2024). Warri, a major city in Delta State, exemplifies these challenges, as it experiences high rates of adolescent pregnancies and STIs, highlighting an urgent need for targeted interventions (Yesufu & Boyi, 2024).

Structured health education programs have been recognized as effective tools in addressing risky sexual behaviors among adolescents (Dickson et al., 2024). Such programs are designed to provide accurate information, build critical thinking skills, and promote positive behavioral changes through interactive and culturally relevant approaches (Hendriks et al., 2024). By equipping students with the knowledge and skills necessary to make informed decisions about their sexual health, structured health education programs have the potential to significantly reduce the prevalence of risky sexual behaviours and their associated consequences. Identifying the best approach or method to delivering the educational instruction is vital.

The lecture method is the most traditional and widely used approach in many educational institutions (Nchia et al., 2017). It is largely a one-way communication route (Bickford & Warren, 2020). The lecture technique is a process by which lecturers impart knowledge to students in the classroom setting. Students' participation in this teaching method is limited to listening, taking notes and organising knowledge (Miller, 2012). Several factors, such as student grade level, subject, and academic goals, must be considered when using the lecture method effectively (Lawless & Yea-Wen, 2019). The lecture method has both benefits and drawbacks. One advantage

is that multiple topics can be covered in a single class hour (Aham-Chiabuotu & Aja, 2017). The technique does not necessitate the use of any specialised equipment, such as a laboratory (Mitra et al., 2020). The students' listening skills are enhanced. It also assists pupils in developing linguistic abilities (Muhamad et al., 2020). Nonetheless, one of the downsides is that the teacher gives the lesson to all students without taking into account their individual learning peculiarities (Lammers et al., 2022). The lecture method places less emphasis on student involvement (Shqaidef et al., 2021). The Universal Design for Learning (UDL) method is a student-centred approach that is proactive in learning, teaching, and assessment (Marvin et al., 2021). It provides a framework for educators, students, and educational institutions to reimagine teaching and learning in new ways that incorporate new evidence and address significant challenges (Davis et al., 2022). It addresses the diverse identities, abilities, learning strengths, and needs of every student in the learning environment (Diaz-Vega et al., 2020). The UDL encourages student involvement and independence by providing a range of choice options and flexibility for learning (James, 2018). Flood and Banks (2021) noted that at the heart of UDL are three principles that educators must address and they include (1) multiple ways for students to engage in their learning such as face-to-face and online lecture and drama narratives (Principle of Engagement); (2) multiple means of concept presentation to provide students with equitable access to the learning content such as take-home fliers, wall posters, pin-ups, and wrist bands (Principle of Representation); and (3) multiple ways for students to demonstrate and experiment with their learning such as role play and pen on paper assessments (Principle of Action and Expression). There is increasing interest among health researchers in the efficacy of applying UDL in Health Education and its knowledge outcomes (Davis et al., 2022).

Despite the documented benefits of health education programs, their implementation in Nigerian secondary schools remains inconsistent, often hindered by inadequate resources, insufficient training of educators, and resistance from stakeholders. There is, therefore, a pressing need for evidence-based studies that evaluate the effectiveness of such programs in improving adolescents' knowledge and attitudes toward risky sexual behaviours. Such research can provide valuable insights for policymakers, educators, public health and child health nurse practitioners, enabling them to design and implement more effective interventions.

This study assessed the effect of a structured health education programs employing the UDL versus the Lecture method on secondary school students' knowledge of risky sexual behaviors in Warri, Nigeria. By evaluating the program's impact, this study contributes to the growing body of evidence on adolescent sexual health education and informs

strategies for addressing the sexual health challenges faced by Nigerian adolescents.

METHODS

Ethical Consideration and Approval: This study adhered strictly to with the Helsinki Declaration of 1975, as revised in 2013. The study was approved by the University of Nigeria IRB.

Design: A non-randomized controlled quasi-experimental design was adopted for this study. This design was chosen to evaluate the impact of the structured health education program on students' knowledge of risky sexual behaviors.

Study Area: The study was conducted in two selected secondary schools in Warri, Delta State, Nigeria. Delta State, situated in the Niger Delta region of southern Nigeria, is known for its diverse population and educational challenges. Warri municipal hosts numerous secondary schools, among which Ekpan Secondary School and Ugbomro Secondary School were purposely selected for this study. These schools were chosen due to their status as the oldest public secondary schools in the area and their relatively large student populations.

Population: The total student population of Ugbomro Secondary School was 279, while Ekpan Secondary School had a population of 506. These two schools formed the basis of the study population.

Sample Size: A total sample size of 558 students was determined for the study, with 279 students assigned to the treatment group and 279 to the control group. The sample size was calculated using Cohen's power analysis formula for paired sample designs (Polit & Beck, 2021):

$$n = ((Z_{\alpha/2} + Z_{\beta})^2 \times 2 \times \delta^2) \div d^2.$$

Where n = Required sample size, Z_{β} = Z-score for the desired statistical power (e.g., 0.84 for 80% power), $Z_{\alpha/2}$ = Z-score for the desired significance level (e.g., 1.96 for $\alpha = 0.05$), σ^2 = Variance of the difference of paired scores (best guess for moderate effect = 4.0), d = Effect size (conventional value = 0.5). The minimum calculated sample size was increased by 10% to account for potential attrition and dropout, ensuring the study maintained adequate power.

Sampling Technique: Simple random sampling was employed to select participants from the target population. Inclusion criteria were: (1) Students aged 10-19 years and (2) Enrolled and actively attending one of the selected secondary schools. Exclusion criteria included: (1) Mental and/or physical instability and (2) Visual impairment preventing independent reading of text without assistance.

Intervention: The structured health education involved the Universal Design for Learning (UDL) approach. The UDL method involves presenting educational content through diverse approaches to enhance learning outcomes (Fornauf & Erickson, 2020). The intervention took place weekly for four weeks. The UDL intervention was a 1-hour program conducted in three stages: lecture, drama, and ribbon pin-up reminder.

The Lecture (30 minutes) session began with a lecture covering the definition of risky sexual behaviors and

related topics. These included: Definition and characteristics of adolescence, Types of risky sexual behaviors, Factors predisposing individuals to risky sexual behaviors, Types of sexual harms and consequences of risky behaviors, Available choices to mitigate risky sexual behaviours, and Discussion of sexual issues and prevention techniques.

In the Drama/Role Play (20 minutes) session, students were divided into four groups, each tasked with planning and performing a 5-minute drama or role play, focusing on preventive choices against risky sexual behaviours. This interactive activity encouraged active participation and practical application of the concepts learned during the lecture.

At the Ribbon Pin-Up Reminders (10 minutes) session, students were given red ribbons to pin on their school uniforms as a visual reminder of the sexual health education received. The ribbons served to reinforce the key messages on risky sexual behaviors and their consequences.

Control: The comparison involved the Lecture Method. The lecture method is a traditional approach to instruction, involves delivering information through an oral presentation (Hafeez, 2021). The lecture only condition was provided weekly for four weeks. In this study, the lecture method was implemented over 1 hour and comprised the following components: actual lecture, verbal evaluation, and question and answer sessions.

The Lecture (30 minutes) was similar to that of the UDL method, covering topics such as the definition of risky sexual behaviors, factors contributing to these behaviors, their consequences, and prevention strategies. The Verbal Evaluation (15 minutes) followed the lecture and the researcher posed verbal leading questions to the participants to assess their understanding of the material. The Question-and-Answer Session (15 minutes) had participants asking questions, which were addressed by the researcher to clarify any doubts and reinforce key concepts.

Both the intervention and comparison conditions were designed to provide comprehensive sexual health education, with the UDL method incorporating a more interactive and multi-faceted approach compared to the traditional lecture method.

Instrumentation for Data Collection: Data were collected using a 29-item self-structured questionnaire on "Knowledge of Risky Sexual Behaviour and Consequences", administered as a self-report questionnaire with a reported reliability coefficient of 0.91. The instrument comprised two sections. Section A: This section consisted of 4 items designed to capture the socio-demographic profile of participants. Information collected included age, gender, grade/class, and country of origin. Section B: This section assessed participants' knowledge of risky sexual behaviors and their consequences using 25 items. Knowledge-related items were numbered 1-6, 9-13, 17-20, and 23-25, while consequence-related items were numbered 7-8, 14-16, and 21-22. Most items in this section were structured as True/False questions, except item 9, which was a single-best-answer multiple-choice question. Each correct

response was awarded 1 point, while incorrect responses scored 0. The total possible score ranged from 0 to 25. Scores were categorized as follows: 0-8: Poor knowledge, 9-17: Fair knowledge, 18-25: Good knowledge.

Data Analysis: The study collected both categorical. Categorical socio-demographic data from Section A and B were summarized using descriptive statistics such as

frequencies and percentages. To evaluate the intervention's effectiveness in improving knowledge of risky sexual behaviors and consequences was assessed using odds ratio inferential statistics at a 95% confidence interval. All statistical analyses were performed using IBM SPSS software version 25 (IBM SPSS, Armonk, USA).

RESULTS

Table 1: Socio-demographic characteristics of the respondents (n = 558)

	UDL treatment group (n = 279), f (%)	Lecture control group (n = 279), f (%)	p value
Age			0.735
10-14	144 (51.61)	148 (53.05)	
15-19	135 (48.39)	131 (46.95)	
Gender			0.931
Female	113 (40.50)	114 (40.86)	
Male	166 (59.50)	165 (59.14)	
Class of study			0.985
Junior secondary 1	64 (22.94)	61 (21.86)	
Junior secondary 2	80 (28.67)	79 (28.32)	
Senior secondary 1	64 (22.94)	67 (24.01)	
Senior secondary 2	71 (25.45)	72 (25.81)	
Who respondent lives with			0.991
Both parents	193 (69.18)	191 (68.46)	
Mother only	38 (13.62)	42 (15.05)	
Relation (Aunty/Uncle)	36 (12.90)	35 (12.54)	
Foster parent (Step father or mother)	12 (4.30)	11 (3.94)	

Chi-squared test was used for comparison, p < 0.05 is significant, f = frequency, % = percent, n = sample size

Table 1 summarizes the socio-demographic characteristics of the respondents and revealed that there was no significant difference between the UDL treatment group and the lecture group ($p > 0.050$). Majority of the respondents were aged 10-14 years, female, in senior secondary 1, and lived with both parents.

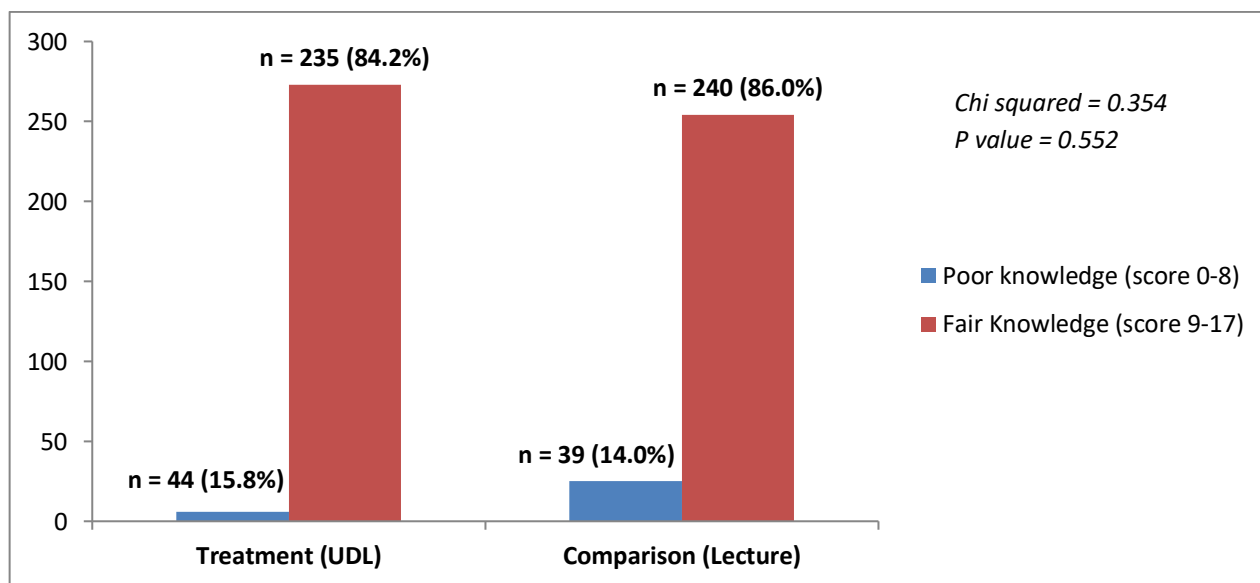


Figure 1: Baseline Knowledge of Risky Sexual Behavior and Consequences

Figure 1 summarises the baseline Knowledge of Risky Sexual Behavior and Consequences and showed that there was no significant difference between the UDL treatment group and the lecture group ($p = 0.552$).

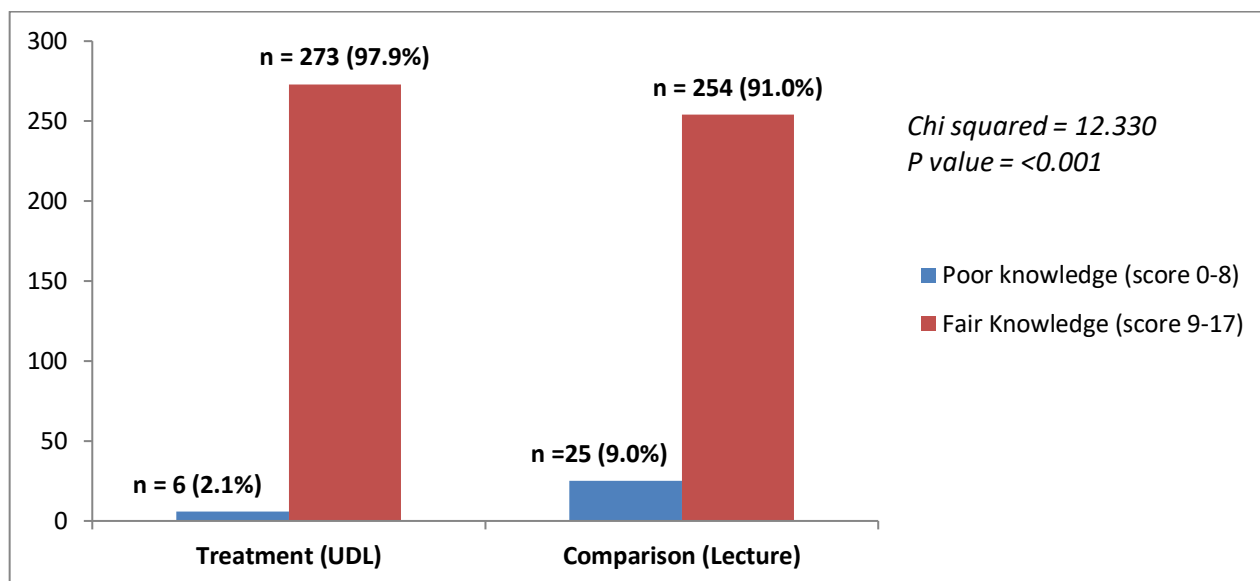


Figure 2: Post-intervention Knowledge of Risky Sexual Behavior and Consequences

Figure 2 summarises the post-intervention Knowledge of Risky Sexual Behavior and Consequences and revealed a significant difference between the UDL treatment group and the lecture group ($p = <0.001$).

Table 2: Effectiveness of the UDL compared to Lecture in improving Knowledge of Risky Sexual Behavior and Consequences

Study groups	Baseline knowledge		Post-intervention knowledge level		Chi squared	P value	OR (95% CI)
	Poor	Fair	Poor	Fair			
UDL (n = 279)	44	235	6	273	31.723	<0.001	8.52 (3.57 – 20.35)
Lecture (n = 279)	39	240	25	254	3.459	0.063	1.65 (0.97 – 2.81)

OR = odds ratio, CI = confidence interval, n = sample size, $p < 0.05$ is significant

Table 2 summarises the effectiveness of the UDL compared to Lecture in improving Knowledge of Risky Sexual Behavior and Consequences and demonstrated that UDL intervention increased knowledge by up to 8.5 times from baseline. Lecture methods increased knowledge by 1.65 but did not reach the level of significance.

DISCUSSION

The pre-intervention findings revealed that both the UDL treatment group and the lecture control group exhibited similar levels of knowledge regarding risky sexual behaviours and their choice-consequences. Statistical analysis confirmed no significant differences between the groups prior to the intervention. This equivalence in baseline knowledge establishes a balanced starting point for evaluating the effects of the interventions. By controlling for initial knowledge disparities, the study ensures that post-intervention differences in outcomes can be directly attributed to the instructional strategies employed, rather than pre-existing variations in knowledge or understanding. One primary reason for this finding is the fact that the respondents were drawn from the socio-cultural environment and had access to similar sources of information and exposure to health education before the study. Schools in the same geographic area often follow comparable curricula, and students may have received basic sexual health education from teachers, parents, or media, contributing to a shared baseline of knowledge. Additionally, the homogeneity in baseline knowledge might reflect limited prior exposure to comprehensive or

targeted sexual health education across the population. This uniformity suggests that any prior education about risky sexual behaviours was general and not differentiated by the type of group (e.g., UDL or lecture), thus resulting in similar knowledge levels across both groups.

These findings align with the design of rigorous experimental studies, which often seek to minimize baseline differences to ensure the validity of comparative analyses. The homogeneity in pre-intervention knowledge suggests that both groups shared similar exposures, experiences, or educational inputs before the study, thereby making them suitable for evaluating the relative effectiveness of the UDL and lecture approaches.

When comparing these results with previous studies, similarities emerge. For instance, studies by Osadolor et al. (2022) found a similar level of baseline knowledge level (95%) among respondents in similar educational contexts among 10-19 years old children. The lack of significant pre-intervention differences in this study strengthens its conclusions by ensuring that observed post-intervention effects are genuine and not confounded by pre-existing knowledge gaps. The

finding emphasizes the importance of establishing a level playing field to accurately measure the impact of health education interventions.

The post-intervention findings of this study demonstrated found that the UDL group achieved markedly greater improvements, with nearly all participants attaining good knowledge of risky sexual behaviours. In contrast, the lecture group not only showed a slight increase in the number of participants with fair knowledge. The stark contrast in post-intervention outcomes can be attributed to the different teaching methods employed. The UDL approach is inherently interactive, learner-centred, and adaptable, engaging students through multiple means of representation, expression, and engagement. This method likely fostered deeper understanding and retention of information, empowering participants to connect the material to their own experiences and apply it practically. Conversely, the traditional lecture method relies heavily on one-way communication, which may not accommodate diverse learning styles and often leads to lower levels of engagement and retention. This pedagogical gap likely contributed to the superior performance of the UDL group.

These findings align with previous research highlighting the efficacy of interactive and participatory learning strategies over traditional lecture-based methods in health education. Studies by Ene-Bongilli and Peter-Kio (2021) and Gomez-Lugo et al. (2022) have shown that comprehensive, student-centred interventions significantly enhance knowledge related to sexual and reproductive health. For instance, a study by Farahani et al. (2020) reported that adolescents exposed to interactive, multimedia-based sexual education programs demonstrated improved knowledge and reduced engagement in risky behaviours compared to peers who received lecture-based instruction.

Furthermore, the minimal improvement observed in the lecture group mirrors findings from previous studies, such as that by Scull et al. (2022), which noted that traditional lecture methods often fail to significantly impact knowledge retention. The slight decline in the lecture group's performance could reflect disengagement or the inability of participants to retain information presented in a passive format.

The findings of this study highlight the superior effectiveness of the Universal Design for Learning (UDL) approach in enhancing adolescents' knowledge of risky sexual behaviors and their choice-consequences. The UDL group consistently demonstrated significantly greater knowledge improvements than the lecture group, with knowledge of risky sexual behaviors increasing by approximately eight times from the baseline. This robust improvement indicates the transformative impact of UDL in fostering a deeper understanding and retention of critical sexual health information. In contrast, the lecture method showed far less improvement, underscoring the limitations of traditional teaching methods in addressing complex, behavior-related topics.

The remarkable success of the UDL intervention can be attributed to its inclusive, flexible, and engaging nature. UDL employs a variety of teaching strategies to accommodate diverse learning styles, including interactive activities, multimedia resources, and opportunities for active participation. This multi-modal approach likely enabled learners to connect with the content more effectively, fostering both comprehension and application. Additionally, UDL emphasizes relevance and adaptability, which are critical for engaging adolescents in discussions about sensitive topics like sexual health. The lecture method, by contrast, relies primarily on passive learning and lacks the interactive elements needed to sustain interest or deepen understanding, resulting in lower levels of improvement.

These findings are consistent with earlier research emphasizing the advantages of interactive and inclusive learning strategies in health education. For example, a study by Gomez-Lugo et al. (2022) found that participatory and learner-centred approaches were significantly more effective than traditional methods in improving knowledge and reducing risky sexual behaviours among adolescents. Similarly, Farahani et al. (2020) noted that interactive programs that engage students actively lead to better outcomes in sexual health education compared to lecture-based approaches.

The eight-fold increase in knowledge observed in the UDL group also aligns with studies that have demonstrated the power of tailored, adaptive teaching methods. For instance, a study by Ene-Bongilli and Peter-Kio (2021) found that using interactive tools and diverse teaching modalities led to substantial improvements in adolescents' understanding of health-related topics. By comparison, the modest gains in the lecture group reflect findings from Constantine et al. (2015), which showed that traditional lecture methods often fail to achieve significant knowledge retention or behavioural change due to their lack of engagement and personalization.

Limitation

The post-intervention knowledge assessments were conducted shortly after the educational intervention, which does not account for the long-term retention of knowledge. Future studies with follow-up assessments over extended periods are needed to determine whether the observed improvements in knowledge are sustained over time.

Conclusion

The Universal Design for Learning (UDL) approach is significantly more effective than traditional lecture-based teaching in enhancing adolescents' knowledge of risky sexual behaviours and their choice-consequences. The UDL method achieved a substantial increase in the proportion of participants with fair knowledge. The lecture-based approach yielded minimal improvements, highlighting its limitations in fostering comprehensive understanding in this critical area of health education.

Based on the findings of this study, school health educators should integrate the UDL approach into their teaching practices to address the diverse learning needs of students. By providing multiple means of engagement, representation, and expression, educators can create an inclusive learning environment that ensures all learners, regardless of their abilities or backgrounds, gain a comprehensive understanding of complex topics such as risky sexual behaviours and their consequences.

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Effect Of A Structured Health Education Program On Secondary School Students' Knowledge Of Risky-Sexual-Behaviors In Warri, Delta State Nigeria

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Appendix A: Questionnaire

Section A: Socio-demographic profile	Response
Age	
10-14	
15-19	
Gender	
Female	
Male	
Class of study	
Junior secondary 1	
Junior secondary 2	
Senior secondary 1	
Senior secondary 2	
Who respondent lives with	
Both parents	
Mother only	
Relation (Aunty/Uncle)	
Foster parent (Step father or mother)	

	Section B: Knowledge of Risky Sexual Behaviour and Consequences Survey	
1	Adolescent are involved in risks sexual behaviours	[] True
		[] False
2	Factors that predispose one to sexual risks include substance and use and drug abuse	[] True
		[] False
3	Engaging in unprotected sexual activities at a time earlier than marriage is a risky behaviour	[] True
		[] False
4	When people are behaving inappropriately in a sexual manner towards me, i will discuss the situation with my parents?	[] True
		[] False
5	One can get information concerning sexual health issues at the health centre or maternity	[] True
		[] False
6	Abstinence is the right choice to make concerning premarital sex	[] True
		[] False

Effect Of A Structured Health Education Program On Secondary School Students' Knowledge Of Risky-Sexual-Behaviors In Warri, Delta State Nigeria

7	Unwanted pregnancy is a consequence of risky sexual behaviour	<input type="checkbox"/> True
		<input type="checkbox"/> False
8	STI is a consequence of premarital sex	<input type="checkbox"/> True
		<input type="checkbox"/> False
9	What does STI stand for?	<input type="checkbox"/> Sexually Transmitted illness
		<input type="checkbox"/> Sexually Transmitted infection
		<input type="checkbox"/> Sexual Toxic Infections
10	One can tell if someone has an STI by looking at them	<input type="checkbox"/> True
		<input type="checkbox"/> False
11	Condoms protect one from catching an STI	<input type="checkbox"/> True
		<input type="checkbox"/> False
12	Hormonal contraception such as the implant can protect women against STI?	<input type="checkbox"/> True
		<input type="checkbox"/> False
13	One can have multiple STIs at once?	<input type="checkbox"/> True
		<input type="checkbox"/> False
14	Genital warts and Genital Herpes can be caught via skin to skin contact	<input type="checkbox"/> True
		<input type="checkbox"/> False
15	HIV can be passed on through oral sex and sex toys?	<input type="checkbox"/> True
		<input type="checkbox"/> False
16	HIV can be passed on through French kissing	<input type="checkbox"/> True
		<input type="checkbox"/> False
17	If an HIV positive person is not on effective treatment for HIV, they can pass the virus	<input type="checkbox"/> True
		<input type="checkbox"/> False
18	If someone has HIV it means they will get AIDS	<input type="checkbox"/> True
		<input type="checkbox"/> False
19	The private area is a part of the body that people should not touch	<input type="checkbox"/> True
		<input type="checkbox"/> False
20	Some methods of emergency contraception can be taken up to 5 days after unprotected sex	<input type="checkbox"/> True
		<input type="checkbox"/> False
21	Drinking alcohol with people can result in rape	<input type="checkbox"/> True
		<input type="checkbox"/> False
22	Having unintended pregnancy may make students drop out from school	<input type="checkbox"/> True
		<input type="checkbox"/> False
23	Touching someone inappropriately defines rape	<input type="checkbox"/> True
		<input type="checkbox"/> False
24	To prevent sexual violation, I must not visit anyone alone	<input type="checkbox"/> True
		<input type="checkbox"/> False
25	It is recommended to seek immediate medical attention if one is sexually violated	<input type="checkbox"/> True
		<input type="checkbox"/> False

Knowledge items = 1, 2, 3, 4, 5, 6, 9, 10, 11, 12, 13, 17, 18, 19, 20, 23, 24, and 25

Consequence items = 7, 8, 14, 15, 16, 21, 22.