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## EFFECT OF DEMONSTRATION INSTRUCTIONAL METHOD ON STUDENTS' ACADEMIC ACHIEVEMENT AND INTEREST IN TECHNICAL COLLEGES

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### Abstract

The purpose of the research was to determine the effect of the demonstration method on the learning outcomes of learners at Rivers State Technical Colleges. A quasi-experimental non-equivalent control group design was used. Three distinct Technical Colleges were chosen to generate a sample size of 135. The researcher's Automobile Technology Achievement Test (ATAT) was utilized to generate data for the investigation. Three experts from Michael Okpara University of Agriculture, Umudike, Abia State's Faculty of Industrial Technology Education validated the instrument. The reliability coefficient was 0.88 using the Kuder-Richardson KR-21. Mean, Standard deviation and Analysis of Covariance were used to analyze the data. The study's conclusions showed that students' academic achievements in automotive technology were better with demonstration strategies when compared to lecture strategies. The study recommends among others assisting students learn new skills and making classes easier for them to understand, teachers should make sure that students are exposed to practical activities through demonstration in the right way

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**Keywords:** Instructional Strategies, Academic Achievements, learning environment, Automobile Repair

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### Introduction

Technical education is designed to cultivate individuals' intellectual and manipulative capabilities so that they may mature into self-reliant and contributing members of society, According to Arah et al. (2017) and Aliyu(2020) Studying technical education involves applying scientific knowledge to the development of practical and applied skills for managing technological problems. With a focus on automotive electrical installation and repair, Aliyu (2020) asserts that the purpose of technical education is to prepare students for rewarding professions in recognized domains. By providing courses that lead to financial independence, technical institutions prepare their students to obtain work, start their enterprises, and hire personnel (Zhang et al., 2023). Good training in vehicle electrical installation and maintenance would help people become self-sufficient, which would reduce the unemployment rate in the country by promoting self-employment, and ultimately lead to the achievement of the previously specified objectives. Students should graduate from Car Electrical Repairs and Installation courses with employable skills and talents to let them develop on their initiative. Research by Morrison et al. (2019) and Maina (2022) shows that students' academic performance is steadily falling as noted by the teachers within the school environment. The physical surroundings of the schools, the curricula, and the instructional strategies the teachers use also assist students in understanding the learning processes which are some of the elements associated with technical education (Maina, 2022).

Ineffective teaching methods may be the cause of students' subpar performance in the Automobile Electrical Repairs / Installation class (Abubakar et al., 2017). The objectives of automobile electrical repairs and installation education have been aggressively pursued, and a comprehensive analysis has been conducted to determine the most effective instructional approaches to promote student performance and skill development. An instructional strategy is a decision on how to organise people, things, and ideas to promote learning (Wordu et al., 2023). Instructional techniques include selecting learning objectives and figuring out how to reach them with certain pupils. Peter and

Sunday (2018) claim that the pedagogical approach and the resources used in the teaching process are both included in the instructional strategy. These instructional strategies include lectures and demonstrations, among others. The demonstration teaching method connects theory to application. which means that this approach blends explanation with the handling or manipulation of actual objects, tools, or materials to teach concepts, principles, or real things. According to Wlodkowski and Ginsberg (2017), the demonstration strategy—which combines verbal and practical representations of a specific task is the most frequently employed teaching approach for the development of practical skills. This approach is enthusiastically adopted by the kids, indicating that it may be effective. According to Kinney's (2015) research, students who attended postsecondary institutions and got integrated scientific training through the demonstration technique performed better than those who did so through lectures. Furthermore, a substantial difference was observed between the impacts of lecture and demonstration instructional strategies on students' skill acquisition in Tomlinson's (2014) study on the effects of instructional techniques on students' learning of goat husbandry abilities.

Students use scientific approaches to collect data and generate conclusions during the demonstration based learning process (Kraft et al., 2018). Concurrent with the demonstration learning technique will be appropriate cognitive and affective learning (Weinert, 2022). Weinert continued, "The investigation upholds proper behaviour and principles and is a fruitful experience." Through demonstration based learning, students can discover and experiment with techniques that help them gain knowledge about the world (Saskatchewan Education, 2009). According to Weinert (2022), pupils who were taught using a guided demonstration method did better than those who were taught using an expository strategy. In 2018, Okoye and Eze conducted research on how guided exploration and lecture approaches affected students' performance on the senior high school chemistry exam. The results of the study showed that guided discovery outperformed the lecture method in increasing student achievement. Additionally, Wheelen (2011) found that students performed better when using the guided demonstration technique when comparing the effects of lecture and demonstration approaches on their chemistry performance.

The lecture method is a traditional teaching approach in which a speaker or teacher gives material to a class of students in a one-way communication setup, according to Peter and Sunday (2018). With this method, verbal instruction serves as the primary means of instruction as the lecturer speaks while the students listen intently and take notes. These are a few of the method's most notable attributes and advantages. Success in Disseminating Information is a Good advantage of lecture strategies. Lecture strategies are a useful tool for providing a large audience with a lot of knowledge in a condensed amount of time. Professionals can share their knowledge, insight, and experiences with a broad audience by engaging in expertise sharing. Consistency: The lecture method contributes to curricular consistency by ensuring that all students receive the same information and subject matter. Among the lecture format's shortcomings is learning passive: students usually passively participate in the learning process since they mostly listen and take notes. This could lead to a decrease in curiosity, understanding, and Very little communication Mo and Liao (2023) claim that little communication or feedback occurs during a lesson between the instructor and the students. While lectures have advantages, they are most effective when combined with other teaching methods. Instructors can enhance their lectures with interactive elements, group projects, discussions, and active learning activities to help students understand the topic better. The benefits of traditional lectures for information transmission are maintained in this hybrid approach, also referred to as the "flipped classroom," which also creates a more engaging and dynamic learning environment for gender equity.

Zhang and Ismail (2023) mention gender as one of these variables that also have a significant effect on students' academic achievement and interest, particularly in science-related courses. A person's gender is determined by their sex and the duties that society has assigned them. According to Budakoğlu et al. (2023) gender is the spectrum of physical, biological, mental, and behavioural traits that characterise and distinguish the feminine and masculine (female and male) people. Numerous studies have also looked at how gender affects students' interest in and academic success in science-related courses.

One of these variables that Zhang and Ismail (2023) mentions as having a significant impact on students' academic achievement and interest, particularly in science-related courses, is gender. A person is classified as either masculine

or feminine based on their sex and the duties that society has assigned them. The spectrum of physical, biological, mental, and behavioural traits that define and distinguish between the feminine and masculine (female and male) populations is known as gender (Budakoğlu et al., 2023). Studies on the impact of gender on students' academic performance and interest, particularly in science-related courses, have also been conducted.

According to Shaidullina et al. (2023), a teacher's ability to choose and implement effective teaching tactics is crucial for student learning. There is no one best way to teach. The ability to plan, organise, and apply one's characteristics, objectives, and competence in the areas of lesson planning, delivery, and assessment is essential for every educator. For education to be more effective and efficient, he needs to be able to motivate students and make good use of resources both in and out of the classroom. Researchers have come up with a variety of approaches, and one of them is the eclectic technique. Institutions of technical education must ensure that their electrical installation and repair courses are taught by qualified, certified professionals. Problems with selecting and implementing effective instructional methodologies for teaching automotive electrical installation and repairs at technical colleges necessitated this study. By filling in the gaps in our understanding of the relationship between instructional strategies and student performance in Automobile Electrical Repairs/Installation courses at Rivers State Technical Colleges, this study should help colleges and universities improve their teaching of this subject (Orie, 2022).

### Statement of the Problem

Particularly in the automotive installation and repair sector, the majority of technical college graduates lack the intellectual and practical skills necessary to function autonomously and as independent contractors (Orie, 2022). These students performed poorly at the end of the programme in school because they were unable to understand the majority of the theories and ideas of automotive electrical repairs and installation. Instructional problems have been mostly held responsible for the widespread low performance in Technical College Automobile Electrical Repairs and Installation. Students' understanding and performance will increase with clear and well-presented instruction in vehicle electrical repairs and installation. In light of previous research on ineffective teaching methods that resulted in low student accomplishment, what instructional techniques should be implemented to improve learning outcomes in Automobile Electrical Repairs / Installation in Technical Colleges in Rivers State?

### Aim and objectives of the study

The purpose of the study was to determine the effect of the demonstration method on the academic achievement of students in Technical Colleges in Rivers State. Specifically, they were to:

1. determine the difference in vehicle electrical installation and repair achievement of students taught using demonstration and those taught using lecture method.
2. determine the extent of students' interest in demonstration teaching on vehicle electrical repairs and installation in a technical college in based on gender.

### Research Questions

- What is the difference in vehicle electrical installation and repair achievement of students taught using demonstration and those taught using lecture method?
- What is the difference in vehicle electrical repairs and installation interest of students taught using demonstration based on gender?

### Hypotheses

**H<sub>01</sub>:** There is no significant difference in vehicle electrical installation and repair achievement of students taught using demonstration and those taught using lecture method

**H<sub>02</sub>:** There is no significant difference in vehicle electrical repairs and installation interest of students taught using demonstration based on gender

## Methodology

The study used a non-equivalent control group and a quasi-experimental design. The sample size consisted of 135 students from three full classes of automobile electrical repairs and installation courses at the three Technical Colleges. Two options for treatment were given to three randomly chosen Technical Colleges (instructional techniques) out of a total of five. The study's three chosen technical institutions had enrolments of 36, 44, and 55 students, in that order. A class of 36 students received instructions using the demonstration method whereas the other two classes were taught using the conventional lecture method. The Automobile Technology Achievement Test (ATAT) was used to collect data for the study's pre-test and post-test. The topics of starting, lighting, charging, and ignition systems were addressed in thirty questions. The instrument underwent verification by three faculty members specializing in education, educational technology, industrial technology education, and measurement and evaluation from Micheal Okpara University of Agriculture, Umudike, Abia State. The Kuder-Richardson Formula - 21 produced an estimated reliability coefficient of .88 for the instrument. A total of 135 students from the three intact classes completed the pre-test utilising the ATAT instrument. The ATAT was administered once more to the identical cohort of students studying Automotive Electrical Repairs/Installation in their respective intact courses, after three weeks of therapy. To examine the hypotheses, the researchers analyzed covariance (ANCOVA) and addressed research concerns by utilising the mean. If the computed F-value exceeded the critical F-value at the alpha level of 0.05, the null hypothesis was rejected; otherwise, it was retained.

## Results

RQ1: What is the difference in vehicle electrical installation and repair achievement of students taught using demonstration and those taught using lecture method?

**Table 1: Mean difference in automotive electrical installation and repair achievement of students taught using demonstration and those taught using lecture method**

Instructional strategy	N	Pre-test	Post-test	Mean Gain	Difference
		Mean	Mean		
Demonstration	36	5.61	21.19	15.58	7.42
Lecture	99	6.17	13.77	7.60	

The average gain score for the demonstration approach is 15.58, whereas the average gain score for the lecture strategy is 7.60, as shown in Table 1. The difference between the two strategies' post-test mean scores is 7.42 points, with the demonstration approach coming out on top with 21.19 and the lecture strategy coming in second with 13.77. When it comes to improving students' academic performance in automotive electrical repairs and installs, the demonstration method could be considered superior to the lecture strategy.

**H01:** There is no significant difference in automotive electrical installation and repair achievement of students taught using demonstration and those taught using lecture method

**Table 2: One-way Analysis of Covariance (ANCOVA) of the difference in automotive electrical installation and repair achievement of students taught using demonstration and those taught using lecture method**

Source of variation	SS	df	MS	F-cal	F-crit.
Pre-test (covariates)	26.863	1	26.863	2.539	
Main effects					
(instructional strategies)	1482.217	1	482.217	140.109*	3.92
Between-group	2154.764	1	2154.764	293.683*	
Within group (error)	1396.433	132	10.579		

\* = Significant at  $p < .05$  alpha level

For degrees of freedom of 1 and 132 at the .05 level of significance, Table 3 shows that the estimated F (140.109) is greater than the necessary F (3.92). This proves that the students' performance in technical college courses on vehicle electrical repairs and installation does not vary much, thereby rejecting the null hypothesis. In technical college courses on electrical repairs and installation for automobiles, students' academic performance differs greatly based on how effectively they execute demonstration and lecture tactics.

**Research question 2** What is the difference in vehicle electrical repairs and installation interest of students taught using demonstration based on gender?

**Table 3: Mean and Standard Deviation of students taught vehicle electrical repairs and installation using demonstration based on gender**

S/N	Students Interest items	Male Mean	SD	Female Mean	SD
1	I like participating in every automobile demonstration learning class	3.57	0.69	3.81	1.03
2	I have all the textbooks on auto battery charging systems.	3.56	0.73	3.10	1.86
3	I prefer the practical/ demonstration classes to any other course.	3.26	0.75	3.70	1.05
4	The lecture time should be extended to 2 hours instead of 45 – 60 minutes.	3.90	0.32	3.95	1.02
5	Automobile animation software learning aid topics are very easy to understand.	3.16	0.89	3.42	0.81
6	The practical aspects of Automobile demonstration learning are enjoyable.	3.95	0.88	3.25	0.83
7	It is better to use the time allocated for other courses for Automobile demonstration learning	3.97	0.95	3.26	0.81
8	I enjoy the teaching methods for automobile demonstration learning methods	3.99	1.08	3.32	0.83
9	Automobile demonstration learning classes are always interesting.	3.88	0.88	3.02	0.98
10	I hardly forget any topic taught in the Automobile demonstration learning method	3.61	0.99	3.03	1.06
11	I do not attend lectures on Automobile except for demonstration learning method	3.57	0.69	3.81	1.03
12	I do not pay attention during Automobile demonstration learning lectures.	3.56	0.73	3.10	1.86
13	I do not participate in automobile intelligence broad-casting practical classes.	3.26	0.75	3.70	1.05
14	I want the automobile demonstration to be removed from the course outline.	3.90	0.32	3.95	1.02
15	I hate doing assignments on Automobile demonstration learning	3.16	0.89	3.42	0.81
16	I will not advise anybody to do a course on Automobile demonstration learning	3.95	0.88	3.25	0.83
17	I always feel dizzy during Automobile demonstration learning.	3.97	0.95	3.26	0.81
18	I do not involved in any discussion on automobile demonstration instruction learning	3.99	1.08	3.32	0.83
19	I do not like the method in which automobile demonstration learning is taught.	3.88	0.88	3.02	0.98
20	The time allocated for automobile demonstration learning should be reduced.	3.61	0.99	3.03	1.06
21	I take an interest in studying engine parts with the demonstration method	3.57	0.69	3.81	1.03
22	I frequently like to work on motor engines during my free periods	3.56	0.73	3.10	1.86
23	Auto-mechanics practical class increases my interest in the auto-mechanics trade.	3.26	0.75	3.70	1.05
24	I prefer an auto-mechanics syllabus that does not require much practical work.	3.90	0.32	3.95	1.02
25	I take an interest in handling automotive faults during a demonstration practical class.	3.16	0.89	3.42	0.81
26	The aspects of automotive systems that I like are more than the aspects that I hate.	3.95	0.88	3.25	0.83
27	I pay much interest in auto-mechanics lessons more than in any other general subjects.	3.97	0.95	3.26	0.81
28	I don't take an interest in anything involving automotive systems.	3.99	1.08	3.32	0.83
29	always wish that lessons on automotive systems should continue even after its time is up.	3.88	0.88	3.02	0.98
30	I prefer an auto-mechanics syllabus that does not require much / demonstration practical work.	3.61	0.99	3.03	1.06
	<b>Grand Total</b>	3.30	0.89	3.19	0.82

**Table 3** revealed that the male student's interest in vehicle electrical repairs and installation using the demonstration teaching method had a mean ranging from 3.16 to 3.99 and a standard deviation of 0.31 to 1.08. The female students had a mean range of 3.02 to 3.96 and a standard deviation of 0.81 to 1.86, the standard deviation showed the homogeneity of the respondents. This signifies that male students had more interest in vehicle electrical repairs and installation using demonstration teaching methods than their female counterparts in the same vehicle electrical repairs and installation.

**H<sub>02</sub>:** There is no significant difference in vehicle electrical repairs and installation achievement of students taught using demonstration based on gender

**Table 4 Analysis of Variance (ANCOVA) of difference in vehicle electrical repairs and installation achievement of students taught using demonstration based on gender**

Source of variation	SS	df	MS	F-cal	F-crit
Pre-test (covariates)	5.075	1	5.075	.636	
Effects (gender)	767.890	1	767.890	96.225*	3.89
Between-group	1947.627	1	1947.627	244.060*	
Within group (error)	1372.580	35	7.980		

\* = Significant at  $p < .05$  alpha level

Table 4 revealed that the F-calculated (96.225) at the major effect is larger than the F-critical (3.89). As a result, the null hypothesis—which claimed that students' interest in vehicle electrical repairs and installations was not significantly influenced by their gender—is rejected. It suggests that, when analyzing the attention displayed on the demonstration technique, male students' interest in automobile electrical repairs and installations differs substantially.

## Discussion

Based on the study's outcomes and in accordance with Orié (2022), it is accurate to assert that both lecture and demonstration strategies significantly influence students' academic performance in automobile electrical repairs and installations in various ways. Distinct disparities were noted in how the lecture and demonstration methods impact students' academic achievements in auto electrical repairs and installation. The data analysis reveals substantial variations in the influence of lecture and demonstration approaches on students' performance in technical college courses focusing on electrical systems in automobiles. This is consistent with the research conducted by Green et al. (2023), which examined the impact of different pedagogical approaches on Integrated Science lessons and students' ability to absorb new knowledge. Their results support the idea that students exposed to demonstration outperformed those taught through lectures.

Students participating in class demonstrations exhibited superior performance compared to their counterparts. The study's findings indicate that students' proficiency in utilizing demonstration and lecture approaches serves as a significant predictor of their success in automobile electrical repairs and installations. Mahfud et al. (2023) investigated the effects of various teaching methods, including demonstration and lecture, on students' grades, and their results aligned with the notion that students guided by a demonstration-based approach excelled. The data analysis further disclosed a gender-based disparity, with male students displaying greater interest in the demonstration teaching method than their female counterparts. This aligns with the findings of Zhang and Ismail (2023) and Wheelen (2011), both of whom observed positive interest in demonstration teaching methods among students studying vehicle electrical repairs and installations. In contrast, Mo and Liao (2023) reported diminished interest among students, particularly based on gender, when taught vehicle electrical repairs and installations using demonstration

## Conclusion

The academic achievement of students in technical college courses in vehicle electrical repairs and installation exhibits significant variation based on teaching methods. The ability of teachers to select and apply the most effective instructional methods is crucial for successful teaching and learning of vehicle electrical repairs and

installation. Moreover, students' performance levels increase when they actively engage in activities during class instruction. The study's findings have substantial significance for education since they indicate that various teaching and learning situations necessitate distinct instructional strategies. This suggests that a teacher cannot proficiently lecture on all subjects addressed in the Automobile Electrical Repairs / Installation courses provided by technical colleges using only one teaching method. Furthermore, certain subjects may be less suitable for demonstration-based learning compared to lecture-based learning, and vice versa. The utilization of the right instructional method in teaching and learning circumstances is crucial for optimal student learning outcomes, which in turn have significant educational ramifications. Furthermore, it suggests that for a teacher to achieve the intended outcome, they must possess expertise in the careful selection and implementation of instructional methodologies to effectively deliver successful training.

### Recommendations

1. To ensure that teachers are sufficiently trained in vehicle electrical repair and installation, the government should offer workshops and seminars on the selection and use of teaching methodologies and materials.
2. When revising the curriculum of work in Technical Colleges, curriculum developers must indicate the instructional methodologies that are most effective for teaching various subject areas.
3. To assist students, in learning new skills and make classes easier for them to understand, teachers should make sure that students are exposed to practical activities through demonstration in the right way.
4. To improve teaching and learning effectiveness, instructors of automobile electrical repairs and installation should use the eclectic approach of teaching, which combines two or more instructional methodologies.

### References

- Abubakar, S. A., Umar, I. Y., Audu, R., Idris, A. M., Saidu, H. A., Mohammed, E. & Afuwagi, U. M. (2017). Effect of Video-Based Anchored Instruction on Student Achievement and Retention in Motor Vehicle Mechanics Work in Abuja and Niger State, Nigeria.
- Aliyu, M. U. S. A. (2020). Effect of Demonstration Method of Teaching on the Academic Performance of Students in Motor Vehicle Mechanic in Yobe State. *International Journal of Innovative Scientific & Engineering Technologies Research*, 8(2), 59-65.
- Arah, S. A., Umar, I. Y., Audu, R., Idris, A. M., Saidu, H. A., Elmahmud, M., & Afuwagi, U. M. (2017). Effect Of Video-Based Anchored Instruction on Students 'achievement and Retention In Motor Vehicle Mechanics Work In Abuja And Niger States, Nigeria.
- Budakoğlu, I. İ., Coşkun, Ö., & Özeke, V. (2023). e-PBL with multimedia animations: a design-based research. *BMC Medical Education*, 23(1), 1-11.
- Green, A., Dong, T., Schreiber-Gregory, D. N., Tilley, L., & Durning, S. J. (2023). Prior enlisted medical students at the Uniformed Services University: outcomes during four years of medical school. *Military Medicine*, 188(Supplement\_2), 1-6.
- Kinney, A. (2015). Compelling counternarratives to deficit discourses: An investigation into the funds of knowledge of culturally and linguistically diverse US elementary students' households. *Qualitative research in education*, 4(1), 1-25.
- Kraft, M. A., Blazar, D., & Hogan, D. (2018). The effect of teacher coaching on instruction and achievement: A meta-analysis of the causal evidence. *Review of educational research*, 88(4), 547-588.
- Mahfud, M., Susanto, N., Widyasari, R., Firdaus, F., & Witasari, R. (2023). Traditional Games as A Learning Strategy to Develop Students' Self-Control. *QALAMUNA: Jurnal Pendidikan, Sosial, dan Agama*, 15(2), 667-674.
- Maina, I. A. (2022). Effect of Petrol Engine Model on Academic Achievement and Interest of Motor Vehicle Mechanics Students in Technical Colleges in Borno State. *International Journal of Information, Engineering & Technology*, 1.
- Mo, Q., & Liao, X. (2023). Survey and Analysis of Employment Intention of Higher Vocational Graduates and Study on Employment Countermeasures:--Based on the employment intention survey results of graduates of Wenzhou Polytechnic from 2020 to 2023. *Journal of Innovation and Development*, 2(3), 84-88.
- Morrison, G. R., Ross, S. J., Morrison, J. R., & Kalman, H. K. (2019). *Designing effective instruction*. John Wiley & Sons.

- Okoye, P. I., &Eze, T. I. (2018). Effects of constructivist instructional method on academic performance and retention of automechanics students in technical colleges. *NAU Journal of Technology and Vocational Education*, 1(1), 173-185.
- Orie, C. J. (2022). Sensor technologies perception for intelligent vehicle movement On Nigerian road network. *The Colloquium*, 10(1), 228-244
- Peter, O. U., & Sunday, N. H. (2018). Competency-based learning (CBL) and animation-based learning: a comparative study on students' academic achievement, interest and retention in auto mechanics.
- Shaidullina, A. R., Orekhovskaya, N. A., Panov, E. G., Svintsova, M. N., Petyukova, O. N., Zhuykova, N. S., &Grigoryeva, E. V. (2023). Learning styles in science education at university level: A systematic review. *Eurasia Journal of Mathematics, Science and Technology Education*, 19(7), em2293.
- Tomlinson, C. A. (2014). *The differentiated classroom: Responding to the needs of all learners*. Ascd.
- Weinert, J. S. (2022). *Online Versus Hybrid Instruction in Undergraduate Cell Biology: A Comparative Study on Student Achievement* (Doctoral dissertation, University of Nevada, Reno).
- Wheelen, T. L. (2011). *Concepts in strategic management and business policy*. Pearson Education India.
- Wlodkowski, R. J., & Ginsberg, M. B. (2017). *Enhancing adult motivation to learn: A comprehensive guide for teaching all adults*. John Wiley & Sons.
- Wordu, C. C., Stanley, T. D., & Otoboh, C. O. (2023). Effect of personal learning network instructional approach on metalwork craft practice students 'achievement in rivers state technical colleges.
- Zhang, X., & Ismail, J. (2023). Animation Technology to Enhance Communication of Cultural Heritage: A Systematic Review. *Malaysian Journal of Social Sciences and Humanities (MJSSH)*, 8(6), e002230-e002230.