



AJOSIE
ISSN: 0189-241X

AWARENESS AND USE OF ANTI-PLAGIARISM SOFTWARE AMONG LECTURERS IN THE FACULTY OF EDUCATION, DELTA STATE UNIVERSITY, ABRAKA

Dr. Esoswo Francisca Ogbomo (CLN)

Associate Professor, Delta State University, Abraka
Delta State University, PMB 1, Abraka, Delta State, Nigeria
ORCID Profile: <https://orcid.org/0000-0001-6559-5488>

E-mail- esoobas@gmail.com

Phone Number: +2348038349691

Abstract

This study examined awareness and use of anti-plagiarism software among lecturers in the Faculty of Education, Delta State University, Abraka. The survey research design was adopted for the study. The population for the study is 111 lecturers in the Faculty of Education, Delta State University, Abraka. The sample size of the study was 111 lecturers. This represents 100% of the population of lecturers at the Faculty of Education, Delta State University, Abraka. Thus, the purposive (total enumeration) sampling technique was adopted for the study. The research instrument used for data collection was a questionnaire. The research questions were analyzed with the use of frequencies and statistical means. The findings of the study revealed that lecturers are somewhat aware of anti-plagiarism software; anti-plagiarism software used by lecturers in the Faculty of Education was Plagiarism Checker X and Turnitin; lecturers in the Faculty of Education at Delta State University, Abraka, rarely use anti-plagiarism software; the utilization of anti-plagiarism detection software by lecturers was hindered by insufficient awareness and knowledge of the software. The challenges faced by lecturers in utilizing anti-plagiarism detection software were primarily attributed to insufficient awareness and knowledge of the software. Finally, the study uncovered potential remedies to address the obstacles encountered by lecturers in utilizing anti-plagiarism technology. These solutions encompass a heightened emphasis on the importance of anti-plagiarism detection software by academic institutions' administration, among other measures.

Keywords: Awareness, Use, Plagiarism Software, Lecturers, and University.

Introduction

Creativity, originality, and keeping to research ethics have become imperative in present-day research in the face of the theft of intellectual property among scholars, which has been on the rise. The need to fathom what thieving is in academic research and the way out of checking the

situation made experts develop detective software. However, the academic research theft detective mechanism popularly known as anti-plagiarism software has helped to identify the representation of another author's language, thoughts, ideas, or expressions as one's original work. Besides, plagiarism is considered a violation of academic integrity, such as truth and knowledge through intellectual and personal honesty in learning, teaching, research, fairness, respect, and responsibility, and a breach of journalistic ethics. The act in question may result in punitive measures, including but not limited to monetary fines, suspension or expulsion from educational or occupational institutions, and potential incarceration (Kim et al., 2016). According to Vinod et al. (2016), plagiarism means stealing others' themes, technology, ideas, and words and reporting them either virally or in writing as one's own. Extension of an idea or product from established sources with credibility. Theft in literature and the arts without giving required credits or permission, making use of others' production. According to Lanier (2016), plagiarism is a type of academic dishonesty.

Anti-plagiarism software refers to a computer program designed to detect instances of replicated textual material on the internet. The software in question could either be a self-contained application that has been installed on the user's personal computer, or it could be a feature that is integrated into a website's functionality. The academic institution frequently adopts anti-plagiarism software to check for plagiarism in research works. In recent years, academic institutions have adopted anti-plagiarism software, also known as plagiarism detection, as a standard practice. Additionally, universities have established policies to uphold academic integrity and prioritize originality in research writing. The issue of digital plagiarism has become increasingly prevalent among educators in the current era of information (Butakov & Scherbinin, 2015). In 2016, the Bayero University Kano implemented the Turnitin software in response to a newly established journal publishing policy aimed at attaining a high level of publishing excellence within the institution and fostering institutional recognition in accordance with global best practices. In its journal publishing policy, under the ethical guidelines of Section 4, it was clearly stated that to facilitate the screening of journal articles

Awareness is the ability to directly know, perceive, feel, or be cognizant of events (Kunschak, 2018). The cognitive capacity of an individual to perceive, interpret, and evaluate a particular phenomenon may be regarded as a manifestation of awareness. It refers to the knowledge about an object or event, the competencies or skills, as well as the methods of operation; it has to do with background knowledge about the object, event, or any other phenomenon (Reinhardt et al., 2015). Singh's (2017) research revealed that a significant challenge in preventing plagiarism in literature is the absence of knowledge or consciousness. Park (2003) conducts a comprehensive analysis of the existing literature on the topic of plagiarism, ultimately determining that instances of plagiarism among university lecturers are prevalent. The author identifies several factors that contribute to this phenomenon, including insufficient awareness of plagiarism, heightened availability of digital resources, inadequate comprehension of plagiarism, time constraints, minimal or nonexistent consequences for engaging in plagiarism, insufficient skills in academic writing, and subpar abilities in referencing. Despite the implementation of anti-plagiarism software in higher education, the efficacy of this measure in reducing academic dishonesty remains limited. Many instructors continue to encounter instances of plagiarism, potentially due to insufficient familiarity with the software and its proper utilization for detecting plagiarism. Undoubtedly, academic dishonesty represents a moral and ethical concern; however, it is worth noting that a deficiency in knowledge and awareness can also amount to plagiarism.

Despite the significant benefits of anti-plagiarism detection software, as revealed through preliminary research and consultation with professional peers, several academic institutions appear hesitant to adopt and integrate this technology. Consequently, academic staff may face challenges in accessing and utilizing such software. Moreover, it has been discovered that a significant proportion of the academic faculty exhibits disinterest in utilizing this software for the purpose of scrutinizing their work, owing to factors such as time constraints, attitude, proficiency, and comprehension of its functionality. Against the aforementioned context, the present investigation was conducted to scrutinize the extent of cognizance and utilization of anti-plagiarism detection software among lecturers affiliated in the Faculty of Education at Delta State University, Abraka.

The extent to which individuals are cognizant of and utilize anti-plagiarism detection software can serve as an effective measure in mitigating instances of plagiarism. The study conducted by Kokkinaki et al. (2015) examined the perception of trainee academic tutors in Cyprus regarding anti-plagiarism detection software and relevant policies. The findings revealed that a majority of academic tutors exhibited limited familiarity with anti-plagiarism software. The study by Kunschak (2018) on multiple uses of anti-plagiarism software found that lecturers embraced the anti-plagiarism detection software due to its affordability. Their feedback suggests that some of the main advantages are a noticeable reduction in, presumably, unintentional plagiarism such as patchwriting, a focus on learner autonomy, and a motivational boost because lectures receive immediate feedback. Similarly, Talab (2014) observed that some software requires the installation of additional software, while others are completely web-based. So, one could understand that anti-plagiarism software is software designed to detect non-referenced works, ideas, and facts taken from other literature.

According to Adamu and Dan-Iya (2020), some of the anti-plagiarism detection software that can be used for checking academic writings in an institution are as follows: Plagiarism Checker X, Quetext (open source), Plagiarisma (open source), Plag Scan (commercial), etc. According to Royce (2013), Turnitin, a commercial software package, has been widely implemented in numerous higher education institutions and remains a favored option for detecting plagiarism. According to iParadigms (2013), a significant proportion of success stories, specifically 87%, have been documented regarding the impact of Turnitin on reducing instances of plagiarism among students and fostering a culture of academic integrity.

The study conducted by Jereb et al. (2018) investigated the factors that impede the adoption of anti-plagiarism software among German and Slovene scholars. The findings of the study suggest that the use of information and communication technology (ICT) and the internet has a substantial influence on the prevalence of plagiarism. The study highlights that the abundance of information resources available on the internet poses a significant threat to the intellectual property of individuals, as it facilitates easy access and indiscriminate use of these resources, thereby compromising their originality and authenticity. Kumar and Mohindra (2019) conducted a comprehensive review of various studies pertaining to the obstacles faced by educators in utilizing anti-plagiarism software. The review revealed that several significant challenges impede the effective use of such software in academic institutions. These challenges include inadequate awareness and deficient academic skills among educators, apprehension of receiving low scores, the ease of accessing online sources for copying, and the absence of penalties for plagiarism-related transgressions. Garba (2018) has identified additional challenges that are software-related. Specifically, certain software programs may not be capable of accurately detecting instances of plagiarism. Additionally, it has been asserted that the identification of plagiarism is unattainable without the assistance of a teacher or professor. Wong's (2005 findings, as cited by Rop (2017),

indicate that the successful implementation of anti-plagiarism software requires the utilization of 11 essential strategies. The implementation process requires consistent support from top-level management. In order for the project to proceed, it is imperative that it obtains an endorsement (Garba, 2018).

Research Questions

The present study was guided by the following research questions:

1. What is the extent of lecturer awareness with anti-plagiarism detection software within the Faculty of Education at Delta State University, Abraka?
2. To what extent is the anti-plagiarism detection software utilized by the lecturers at Delta State University, Abraka?
3. To what degree do lecturers within the Faculty of Education at Delta State University, Abraka, employ anti-plagiarism detection software?
4. What are the obstacles in the implementation of anti-plagiarism detection software at the Delta State University?
5. What are the potential resolutions to the issue of anti-plagiarism detection software utilization by lecturers at Delta State University?

Method

The descriptive research design was used for this study. The population for the study is 126 lecturers in the Faculty of Education, Delta State University, Abraka. The sample size of the study was 126 lecturers. Therefore, the total enumeration sampling technique was adopted for the study to enable every member of the population to be used for the study. The research instrument used for data collection was a questionnaire. The collected data was presented and analyzed using descriptive methods such as frequencies and statistical means. The criterion mean is placed at 3.00.

Results and Discussion

Table 1: Level of Lecturer's Awareness of Anti-Plagiarism Software.

S/n	Items	Extremely Aware	Moderately Aware	Somewhat Aware	Slightly Aware	Not at all Aware	Mean
1	Plagiarism Checker X	40	27	9	7	4	4.06
2	Viper	32		27	19	6	3.91
3	Turnitin	31		26	20	7	3.86
4	Plag Scan	3		12	26	25	2.44
5	Dupli checker	8		11	14	22	2.32
6	Copy Leak	9		12	12	18	2.31
7	Quetext	13		6	5	20	2.15
8	Plag Tracker	2		7	13	19	1.85
9	Plagiarism	6		9	8	26	1.80
10	Lag Tracker	6		5	3	18	1.72
11	Plagium	2		4	6	8	1.46
	Average Mean						2.53
	Criterion Mean						3.00

With an aggregate mean of 2.53, which is lower than the criterion mean of 3.00, it can be concluded that lecturers in the faculty of education at Delta State University, Abraka, are somewhat aware of anti-plagiarism software.

Table 2: Anti-Plagiarism Software Used by the Lecturers

S/N	Items	Agree		Disagree	
		Freq	%	Freq	%
1	Plagiarism Checker X,	82	94.25	5	5.75
2	Turnitin	77	88.51	10	11.49
3	Plag Scan	29	33.33	58	66.67
4	Copy Leak	25	28.74	62	71.26
5	Viper	23	26.44	64	73.56
6	Lag Tracker	16	18.39	71	81.61
7	Quetext,	13	14.94	74	85.06
8	Plagium	12	13.79	75	86.21
9	Plag Tracker	11	12.64	76	87.36
10	Plagiarism	9	10.34	78	89.66
11	Dupli checker	8	9.20	79	90.80

Table 2 revealed information regarding the anti-plagiarism software used by the lecturers in the faculty of education at Delta State University, Abraka. As revealed, respondents agreed that they use anti-plagiarism software such as Plagiarism Checker X 82 (94.25%), Turnitin 77 (88.51%), Plag Scan 29 (33.33%), Copy Leak 25 (28.74%), Viper 23 (26.44%), Lag Tracker 16 (18.39%), Quetext 13 (14.94%), Plagium 12 (13.79%), Plag Tracker 11 (12.64%), Plagiarisma 9 (10.34%), and Dupli Checker 8 (9.20%). And from the responses of the lecturers, it can be concluded that the anti-plagiarism software used by the lectures is Plagiarism Checker and Turnitin.

Table 3: Extent Lecturers Use Anti-Plagiarism Software

S/N	Items	Always	Often	Sometimes	Rarely	Never	mean
1	Plagiarism Checker X	42	32	10	2	1	4.29
2	Turnitin	29	22	28	5	3	3.79
3	Viper	12	11	25	21	18	2.75
4	Plag Scan	4	7	10	13	53	1.80
5	Quetext	3	5	7	5	67	1.53
6	Copy Leak	0	2	12	15	58	1.52
7	Lag Tracker	1	2	6	6	72	1.32
8	Plag Tracker	0	0	7	11	69	1.29
9	Dupli checker	0	0	5	7	75	1.20
10	Plagium	0	0	0	14	73	1.16
11	Plagiarism	0	0	5	2	80	1.14
	Average Mean						1.98
	Criterion Mean						3.00

With an aggregate mean of 1.98, which is lower than the criterion mean of 3.00, it can be concluded that the lecturers in the Faculty of Education at Delta State University, Abraka, rarely use anti-plagiarism software.

Table 4: Challenges Encountered in the Usage of Anti-Plagiarism Software by Lecturers

S/ N	Items	Agree		Disagree	
		Freq	%	Freq	%
1	Inadequate knowledge of the usage of the software	74	85.06	13	14.94
2	Inadequate awareness of some of the anti-plagiarism software	58	66.67	29	33.33
3	The inadequate capability of some software in checking everything on the net, for example, images and some computer programs	28	32.18	59	67.82
4	Certain software applications have been unable to accurately identify the specific content that has been plagiarized.	17	19.54	70	80.46
5	the absence of punishment for plagiarism-related offenses	16	18.39	71	81.61
6	Fear of being scored poorly	14	16.09	73	83.91
7	The opportunities for copying offered by the Internet	7	8.05	80	91.95

Data in Table 4 revealed challenges encountered in the usage of anti-plagiarism software by lecturers at Delta State University. The majority of the respondents agreed to inadequate knowledge of the usage of the software (74 (85.06%)), inadequate awareness of some of the anti-plagiarism software, 58 (66.67%), the inadequate capability of some software in checking everything on the net, for example, images and some computer programs 28 (32.18%), some software has not been able to detect the exact material plagiarized (17.54%), and the absence of punishment for plagiarism-related offenses 16 (18.39%), fear of being scored poorly at 14 (16.09%), and the opportunities for copying offered by the internet at 7 (8.05) are some of the challenges encountered in the usage of anti-plagiarism software. From the response, it can be concluded that the challenges facing lecturers in the use of anti-plagiarism software are inadequate knowledge of the usage of the software and inadequate awareness of some of the anti-plagiarism software.

Table 5: Solutions to the Problem in the Usage of Anti-Plagiarism Software by Lecturers

S/N	Items	Agree		Disagree	
		Freq	%	Freq	%
1	Adequate awareness of the use of anti-plagiarism software should be taken seriously by the school management	85	97.70	2	2.30
2	Nigerian universities should invest in developing anti-plagiarism detector software	84	96.55	3	3.45
3	Lectures should be trained on how to use the anti-plagiarism software	82	94.25	5	5.75
4	University management should adopt and implement the use of anti-plagiarism detection software to checkmate and or reduce the level of academic dishonesty	81	93.10	6	6.90

There is still a need for academic staff to be enlightened on the existence and functions				
5	of the software.	79	90.80	8 9.20
Punishment for plagiarism-related offenses				
6	should be adopted	26	29.89	61 70.11

Table 5 presents the responses and solutions pertaining to the issue encountered by instructors in utilizing anti-plagiarism detection software. The findings indicate that a significant proportion of the participants concurred that it is imperative for educational institutions to prioritize the dissemination of adequate knowledge on anti-plagiarism detection software, as evidenced by 85 (97.70) respondents who agreed. Additionally, a considerable number of participants, specifically 84 (96.55), expressed their support for Nigerian universities to invest in the development of anti-plagiarism detection software. Furthermore, the majority of the respondents, 82 (94.25%), opined that it is crucial for educators to receive training on the utilization of anti-plagiarism software. The study also revealed that 81 (93.1) participants believed that the adoption and implementation of anti-plagiarism detection software by university management could serve as a viable strategy to mitigate academic dishonesty. Despite the high level of agreement on the importance of anti-plagiarism detection software, the study identified a need for further enlightenment among academic staff, as indicated by 79 (90.80) respondents. Lastly, the participants recommended the adoption of punitive measures for plagiarism-related offenses. The lecturers in the Faculty of Education have proposed several solutions to address the issue of anti-plagiarism software usage, including the identification of 26 (29.89) potential resolutions. The findings suggest that a significant proportion of respondents expressed dissent towards the propositions pertaining to the implementation of punitive measures for acts of plagiarism.

Discussion of Findings

The study revealed that lecturers possess a certain level of awareness with anti-plagiarism detection software. As their familiarity with anti-plagiarism detection tools such as Turnitin increased. The present study aligns with Pappas' (2014) research, which examined the level of awareness among educators regarding the utilization of anti-plagiarism detection software in research. Pappas' findings indicated that the awareness level was not particularly promising, as the majority of educators were only familiar with one or two anti-plagiarism detection programs. This discovery is corroborated by the research conducted by Omosebi and Omosebi (2020), which revealed that a significant proportion of the participants exhibited only moderate levels of awareness or were completely unaware of the existence of anti-plagiarism detection software.

Another finding revealed that the study, the anti-plagiarism software used by lecturers in the Faculty of Education was Plagiarism Checker X and Turnitin. Most of the respondents disagreed with using plagiarism software like Quetext, plagiarism, plag scan, viper, copy leak, duplicate checker, plag tracker, platinum, and lag tracker. This finding is supported by the findings of Adamu, and Dan-Iya (2020) in their study of awareness and utilization of anti-plagiarism detection software among academic staff at Yusuf Maitama Sule University. The research conducted revealed that a minority of participants, specifically less than 50%, utilized anti-plagiarism detection software. This indicates that the majority of respondents were not engaging in active usage of such software to verify the authenticity of academic compositions. It is

noteworthy that the academic institution under investigation did not incorporate or embrace any anti-plagiarism detection software for academic purposes.

Yet another study revealed that the utilization of anti-plagiarism detection software among lecturers in the Faculty of Education at Delta State University, Abraka is limited, with only Plagiarism Checker and Turnitin being employed. This investigation aligns with the research conducted by Adamu and Dan-Iya (2020), which revealed that Checker X, Turnitin, and Viper are the prevailing anti-plagiarism detection tools utilized for scrutinizing scholarly compositions within academic institutions. In concordance with the above, iParadigms (2013) also stated that in recent years, Turnitin has gained popularity as more and more institutions use it to combat plagiarism. There have been 87 percent success stories reported on the effects of Turnitin on the incidence of students' plagiarism and the promotion of honest academic writing (iParadigms, 2013). In contrast to the aforementioned results, Adamu, and Dan-Iya (2020) discovered in their research that a significant proportion of participants from the institutions examined did not utilize any anti-plagiarism detection software.

The study revealed that certain obstacles faced by lecturers when utilizing anti-plagiarism detection software include insufficient familiarity with the software and insufficient proficiency in operating it. The present discovery is consistent with the research conducted by Kumar and Mohindra (2019), which posited that a significant obstacle to the effective utilization of anti-plagiarism software was a dearth of understanding and inadequate proficiency in its operation.

The study findings indicate that lecturers encounter challenges in utilizing anti-plagiarism software. Some of the suggested solutions to these challenges include increasing awareness of the importance of plagiarism software among school management, as well as implementing anti-plagiarism detection software in universities to mitigate academic dishonesty. The present study's results are consistent with Rop's (2017) research, which posited that the successful implementation of anti-plagiarism software necessitates the use of specific strategies and the unwavering support of top-level management throughout the implementation process.

Conclusion

The current research investigated the level of familiarity and utilization of anti-plagiarism detection software among lecturers at Delta State University, Abraka. The study focuses exclusively on lecturers in the field of education, yet it provides valuable insights into their awareness of plagiarism detection software and its utilization as a means of addressing plagiarism. The findings indicate that the degree of familiarity with the software among the faculty members in the education department at Delta State University is moderate. However, the degree to which the software is employed for the purpose of identifying instances of plagiarism is somewhat limited. The findings of this study demonstrate that in order to combat plagiarism in a meaningful way, it is crucial to revisit the fundamental principles of promoting awareness, providing training, and offering education on the impact of plagiarism. Additionally, it is imperative to establish a clear and unambiguous institutional policy on plagiarism and to undertake efforts to shift attitudes away from the "Publish or Perish" mentality. To summarize, the implementation of plagiarism detection software represents a viable and comprehensive approach to fostering academic integrity within the academic community.

Recommendations

Given the findings, the researcher made the following recommendations:

1. The university management should step up its awareness campaigns and instruction on how to use anti-plagiarism detection software to actively lower the rate of plagiarism.

2. Lecturers should not be limited to a few anti-plagiarism software programs; other plagiarism software programs should be used as well.
3. Lecturers should make use of anti-plagiarism software regularly to check for and reduce academic dishonesty.
4. The challenges encountered in the usage of anti-plagiarism software by lecturers include inadequate awareness and little or no knowledge of the software.
5. Several solutions have been proposed to address the challenges encountered by lecturers when using anti-plagiarism software. These include increasing awareness of plagiarism and its detection, adoption, and implementation of anti-plagiarism detection by university management, investment in the development of plagiarism detector software by Nigerian universities, and provision of training to lecturers on the use of anti-plagiarism software.

References

- Adamu, R., & Dan-Iya, S.M. (2020). Awareness and Utilization of Anti-Plagiarism Detection Software among Academic Staff of Yusuf Maitama Sule University. *Research Journal of Library and Information Science*, 4(2), 9-21.
- Butakov, S., & Scherbinin, V. (2015). The toolbox for local and global plagiarism detection. *Computers & Education Journal*, 52 (18), 781-788.
- Garba, F.A. (2018). Evaluating the necessity of third-party antivirus software on windows operating system. *Scientific and Practical Cyber Security Journal*, 3 (3), 1-11.
- iParadigms. (2013). Instructor training: About originality check. Retrieved from http://www.turnitin.com/en_us/training/instructor-training/about-originalitycheck July 26, 2016.
- Jereb, H., Nikam, U., Khaizer, T., & Mahadevaswamy, M. (2018). Attitudes and perceptions of the research scholars towards the use of anti-plagiarism software for quality research output: A Study. *Journal of Advancements in Library Sciences*, 2 (3), 7-17. 55-59.
- Kim, B. Hwang, H., & Shim, Y. (2016). Plagiarism detection software and academic integrity: the Canadian perspective. *Research Gate*, 2(3), 1-8.
- Kokkinaki, A., Demoliou, C., & Iacovidou, M. (2015). Students' perceptions of plagiarism and relevant policies in Cyprus. *International Journal for Educational Integrity*, 11(1), 1-11.
- Kumar, A., & Mohindra, R. (2019). Exploring awareness and attitude on plagiarism among research scholars: A case study of Panjab University, Chandigarh (India). *Library Philosophy and Practice (e-journal)*. 255. <https://digitalcommons.unl.edu/libphilprac/2551>
- Kunschak, H. J. (2018). Multiple uses of anti-plagiarism software. *The Asian Journal of Applied Linguistics*, 2(5), 1-18.
- Lanier, M. M. (2016). Academic integrity and distance learning. *Journal of Criminal Justice Education*, 17(2), 244-261.
- Omosebi, P.A., & Omosebi, F.E. (2020). Information literacy skills and the use of e-library resources among undergraduates in south-west Nigeria. *Library Philosophy and Practice (e-journal)*. 4336. <https://digitalcommons.unl.edu/libphilprac/4336>
- Park, C. (2003). In other people's words: Plagiarism by University students-literature and lessons. *Assessment & Evaluation in Higher Education*, 28(5), 471-488.

- Pappas, C. (2014). Five (5) important reasons to use free plagiarism checkers in e-learning. <https://elearningindustry.com/5-important-reasons-to-use-free-plagiarism-checkers-in-elearning>
- Reinhardt, M., Wilson, S.H., Mark, L., & Lewis, G. (2015). Understanding the meaning of awareness in research. *Studies in Higher Education Journal*, 36 (6), 49-64.
- Rop, S. (2017). Plagiarism detection software and its appropriate use. *Nurse Author & Editor*, 29(1), 1-10.
- Royce, J. (2003). Has Turnitin.com got it all wrapped up? *Teacher Librarian Elibrary*, 1-7.
- Singh, N. (2017). Level of awareness among veterinary students of GADVASU towards plagiarism: a case study. *The Electronic Library*, 35 (30), 899-915.
- Talab, L. (2014). Implementing plagiarism policy in the internationalized university. *International Journal of Education and Research*, 2 (12), 397-410.
- Vinod, T. Sandhya, G.Sathish, W.Harani, G. L. Banji, U., & Banji. K. (2016). Perceptions of plagiarism among undergraduate medical students in Rawalpindi, *Pakistan. Pakistan Journal of Medical Sciences*, 35(2), 532-541.