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Waste management education: A driven concern for academic community

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Abstract

The current research evaluated waste management education-related articles – in which a total of 172 articles identified. At the same time, 70 articles were mainly connected to the research topic and considered high rated journals as a database for the study. Consequently, qualitative content analyses of the articles were done manually and by analysing search results system. The content analysis results revealed the trend of the article's publication yearly- theoretically, practically and methodologically. The analysis disclosed less attention and emphasis given to 3Rs and landfill according to the percentage rating (2.90%) of 66 related articles on waste management education. Thus, the essence of waste reduction and waste education need to be reinforced among various waste generators and the rules and activities regarding waste reduction need to be acknowledged and initiated. Awareness and enthusiastic, forthcoming events and encouragements occupied a vital position in how discarded materials could minimise. This study significantly upon the ground of conclusion, calls for more papers and further research from various academic communities in context.

KEYWORDS: Academic Communities; Education; Landfill; Management; Methodologically; Practically; Theoretically; Waste; 3Rs (Reduce, Recycle and Re-use waste)

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1. Introduction

An incontrovertible fact revealed in this age is that no nation is left out from the present challenges of waste management. The entire world faced enormous waste pollution, including soil degradation, environmental health-related issues, loss of vital biodiversities, and environmental threat [1] [2]. Whether higher or pre-higher, the school communities are great tools to actualise the biosphere stability for all generations continuously. Students, individuals, communities, government, Non-Governmental Organisations, and corporate organisations are the foremost advocates that can make this happen in this contemporary world [3]. It is vital to establish an effective and efficient waste control system to stabilise the environment for growth and advancement in various human endeavours [3]. It is pertinent at this conjunction for every society to safeguard and conserve its valuable natural endowments. Everybody is responsible for being committed and motivated towards environmental stability in all man livelihood sources [4].

However, many nations continue to struggle with waste pollution menace, particularly in the third world countries where the challenges have not holistically addressed. Countries in Africa, Asia, and South America are not exempt from waste management challenges [5]. From the practical perspective, environmental lessons should be incorporated into the school curriculum at every level in academic communities [6]. Students should be influenced positively in all their characteristics, possession, and knowledge to minimise waste and educate people about waste management [7]. Education cannot be underestimated because it is an efficient tool and avenue that massively influence people consciousness, perception, habit, and understanding toward all matters relating to the environment [8]. It a common scenario in most highly congested cities in the world to realise a vast bulk of waste generated because of rapid population growth. This desperately calls for immediate solutions in raising alertness that will challenge and collaborate people at all levels to embrace waste cutting [9].

On the other hand, many nations of the world have also clamoured to re-strategize. It involved repositioning all their efforts toward minimising waste at the open dumping ground, establishing waste reprocessing facility centres and encouraging re-utilisation of waste products [10]. Often in a business environment, most big companies comply with related environmental issues like waste pollution than minor industries which impact much felt within immediate human surroundings. This equation implies that every stakeholder in all trading investments regardless of their size must be environmentally responsible for meaningful development [11].

Besides, attention and research need to shift from public people to an academic environment where great attention is needed [12]. They did a thorough analysis and attempted to change the attitudes of students toward waste management education positively. Consequently, the students today will still end up being part of the big society. They are already part of the big society. It indicates that great attempts are being made to shape and to impact the culture and practices of waste cutting. School curriculum should promote environmental stability and sustainability [13] - because the issue at hand is a big-time state and global problem. There is a need to finetune a way out through scholarly research and create effective waste management education programs in various academic environments and larger societies. Indeed, academic environments are a knowledge-based system that could provide a way out to the challenges facing human environmentally in the area of waste pollution [14].

Based on research works, Tertiary Academic Communities (TAC) are often seen as the catalyst that propels transformation in a nation. These thereby emerged in works and facilities, especially waste administration on a community's catchment. It is vital to attain environmental balance [15], which represents a standardised yardstick in every nation of the world. This is because they set a pace to be formally capable and obligated to handle matters relating to man's immediate surroundings in the area of waste management education and cutting [16], [17]. According to the United Nations Report [18],

TAC embarked on environmentally friendly activities. Contrarily, they designed a connection that networks awareness and information in a given nation. On the other hand, TAC promotes national growth via various activities and skills. Even in this dispensation, TAC has tasked to implement environmentally friendly cultures as accorded in Rio + 20 – which activities and operations are seen all over academic communities in the world [19]. Also, a global social interactive circuit called ISCN (International Sustainable Campus Network) formed to encourage sharing of knowledge, innovations, and operational skills in the circuit of various academic communities, in order to attain and maintain ecological balance in implementation, collaboration and study [20]. The global waste administration operations as a significant academic community agenda were instituted by representatives of international groups who originate from over twenty nations globally . This promotes environmentally friendly activities. For instance, waste origin segregation and public waste reprocessing centres executed by Massey University, which is a waste reprocessing trade plan by motivated scholars, such as giving out utilised office materials, wood furnishing wares and electrical gadgets re-utilised by freshly admitted scholars in Japanese society. Also, in Great Britain, a headway leading to empty waste plan was initiated with the mission to execute waste re-utilisation plans in scholar hostels all-around academic communities [17].

From a global perspective, waste creations are not the same across every nation globally. It depends enormously on capital per head, population, economic advancement, technological advancement, infrastructure availability, and urban growth rate. According to the statistics provided by the World Bank, Africa continent's (inclusive with the western part, eastern part, and southern part) waste creation was estimated to about Sixty-Two Million (62M) Tonnes annually. It is low due to the level of capital per person. The yearly waste creation in the eastern part of Asia and Pacific island nations is estimated to be about Two Hundred and Seventy Million (270M) Tonnes annually – which is usually dominated by China with 70 per cent of the total coverage [21]. The eastern and core parts of Asia produced Ninety-Three Million (93M) Tonnes of waste annually. At the same time, South America and Central America have a detailed data of waste creation of about One Hundred and Sixty Million (160M) Tonnes annually due to high rate of tourism activities compared to the rate estimated for Sub-Sahara parts of Africa [22]. The core Arabian nations and northern parts of Africa produced an estimated waste of about Sixty-Three Million (63M) Tonnes annually. However, the European Communities created estimated waste of about Five Hundred and Seventy-Two Million (572M) Tonnes annually. On the part of Asia again, the Southern part of Asia continent produced an estimated waste of about Seventy Million (70M) Tonnes annually. Thus, the overall estimated data of waste creation across the world revealed that the European nations toppled most among nations that produce waste globally [23]. Consequently, it was also predicted that into the year 2025, different waste origination will be created across various world countries based on capital per nation. In this regards, small capital nations like Niger, Chad, Mali, Papua Guinea, Madagascar, Burma, Haiti etc., shall produce biodegraded waste of 64 percent, paper waste of 5 percent, plastic waste of 8 percent, glass waste of 3 percent, metal waste of 3 percent and other waste of 17 percent. Small average capital nations like Armenia, Indonesia, India, Iraq, Cameroun, Nigeria, Morocco, Senegal etc., shall produce biodegraded waste of 59 percent, paper waste of 9 percent, plastic waste of 12 percent, glass waste of 3 percent, metal waste of 2 percent and other waste of 15 percent and higher average capital nations like Albania, Belarus, Argentina, Brazil, Cuba, Bulgaria, Botswana, Mexico, Panama, Peru, Russia, China, South Africa, Serbia, Turkey, Malaysia etc., shall produce biodegraded waste of 54 percent, paper waste of 14 percent, plastic waste of 11 percent, glass waste of 5 percent, metal waste of 3 percent and other waste of 13 percent. Finally, upper capital nations like Australia, Austria, Bahrain, Saudi Arabia, Qatar, Belgium, United Kingdom, Canada, Chile, Denmark, Estonia, France, Israel, Italy, Japan, Malta, Norway, ,Spain, United State of America, Sweden

etc., shall produce biodegraded waste of 28 percent, paper waste of 31 percent, plastic waste of 11 percent, glass waste of 7 percent, metal waste of 6 percent and other waste of 17 percent [24] [25].
Considering all the above information, views, and attributes connected to waste menace in our modern societies, this current research or article is designed to critically evaluate 172 published articles from the period of 2008 to 2018 on waste management education. The research focused on the distribution, source, common related issues, and frequency of articles related to 3Rs (Reduce waste, Re-use waste and Recycle waste). Landfill is considered along with the theoretical, practical or both theoretical and practical issues. The distribution of the research design depends on quantitative, qualitative, and mixed research methods.
On a critical basis, the vacuum for mixed qualitative and quantitative research in the appraisal of waste management education from 2008 to 2018 may significantly find wanting in this recent research. In this regard, this research set to bridge the lapses by appraising the extent of qualitative and quantitative research on waste management education, which is affirmed vividly on formulated research questions. It is crucial at this conjunction to evaluate the changes in article publication from the period of 2008 to 2018 on waste management education concerning the following research questions highlighted below:

1. What is the distribution of the articles depending on years?
2. What is the distribution of the articles depending on the source?
3. What are the common related issues in the publication of the article?
4. How many of the articles related to reducing waste, re-use waste, recycle waste and landfill?
5. What kind of approach to the articles followed depending on the theoretical, practical or both theoretical and practical issues?
6. To what degree is the research design distribution depending on quantitative, qualitative, and mixed research methods?

1.1 Significance of the Study

Educators or environmentalists have widely thought that waste management teaching is a valuable segment of numerous academic communities' environmental activities. It ranges from pre-primary to tertiary institutions- even communities, organisations, and policymakers not kept behind sustainable environmental teaching activities. There is minimal work carried out in the past and present on the subject of waste management teaching. Most research works centred on activity and teaching initiatives without considering the application of academic and practical techniques. In conjunction with previous studies, which revealed a preliminary study on waste management education, there were substantially low research without any comprehensive practical and conceptual base, inadequate information and works on the subject of study [26]. People misinterpreted the high rate of ecological destruction with massive waste generation.
On the contrary, many people and activists are motivated constructively in various areas where waste management education established through academic communities and governmental agencies. The fundamental issue remains that waste administration challenges have triggered up tremendously in third-world nations and advanced nations. Past and present records revealed poor execution of waste administration teaching and sensitisation plans. The initiation of these plans is crucial to enlighten the people and enhance the advancement of an eco-cooperative society of positive attitude toward waste teaching and learning. These plans further demand consistent reinforcement of teaching on 3Rs and other related information about waste. These also imply that waste teaching is about theory and the

evidence that could transform people's mentality and conception about waste in our dynamic societies [27]. This current study addresses some vital aspects of the article regarding waste management education – such as the distribution of article on yearly and sources basis, common related issues, theoretical and practical issues, and methodological approach of precisely 172 articles. Thus, all those mentioned earlier were analysed statistically, theoretically, and practically using relevant citations. It also opens up more grounds for researchers to further advance studies. It creates a transformation or catalyst of change in people conduct action and zeal towards waste management education. However, this will create an institutional change in households, academic communities, municipal areas, and business institutions across nations in the world.

2. **Methodology**

2.1 Source of Data

This study is entirely narrative in the concept of its report of articles covering 11 years interval (2008 – 2018) on waste management education. Secondary data from about 172 articles were the source of this research's data, coupled with other reliable secondary sources. It addresses the focus of the ongoing research, in which the previous research utilized qualitative and quantitative studies. The data is duly sorted out, appraised, analysed, discussed, and concluded critically to create a bridge for further research.

In this current research, the approach of content analysis is centred on the basic structure and principles of [28] and [29] and it is also planned and enumerated comprehensively according to [30],[31] respectively. This research on content analysis utilises a critical investigative approach to ascertain the study's level of Scopus publications connected to waste management education from 2008 to 2018. The postulation at the ambit of content analysis assumed that the investigator should comprehend human reasonings from different perspectives [32].

The number one procedure initiated by [29] in content analysis is to entrench selection frameworks – which are termed in this research as Scholastic Publications of Scopus that focused on waste management education. Scopus publication was one of the highest circulating journals in the world. The 172 articles derived as selection frameworks generated base on the year (2008 -2018), subject areas (Social sciences), document types (Article) and the analysis of the results were limited to the selection ascribed. One hundred and seventy-two articles used in total, but five of the international journals enlisted as a source in this content analysis are as follows:

- Sustainability Switzerland
- Asian Social Sciences
- International Journal of Sustainability in Higher Education
- Journal of Chemical Education
- Mediterranean Journal of Social Sciences

However, to give room for diverse opinions within this ambit of study, five journals were equally selected and added to widen the horizon of the research. These are Applied Environmental Education, European Journal of Social Sciences, International Educational Studies, International Journal of Environmental and Science Education and International Journal of Management in Education. These journals derived from the total of forty-three journals of Scopus publication, which also considered along with other articles (precisely 172 articles). It expanded the scope of study and thoroughly assessed based on theoretical and practical issues. These relate to waste management education (see Figure 1, showing a chart of articles published related to waste management education).

The second procedure is to decide the research message framework – which primarily focused on waste management education. It relies on opinions, facts, illustrations, assessments, and systematic approaches of articles [33].

Besides, the content analysis is structured manually. It revealed findings based on topics, abstracts, study schedules, introduction/background of the study, methodology, and evaluation of conceptual works in the selected academic articles' ambit. In this regard, the study aimed to analyse the level of works done in connection to waste management education in different journals. It ascertained whether more attention given or not to the attested theme and therefore advocate for further studies.

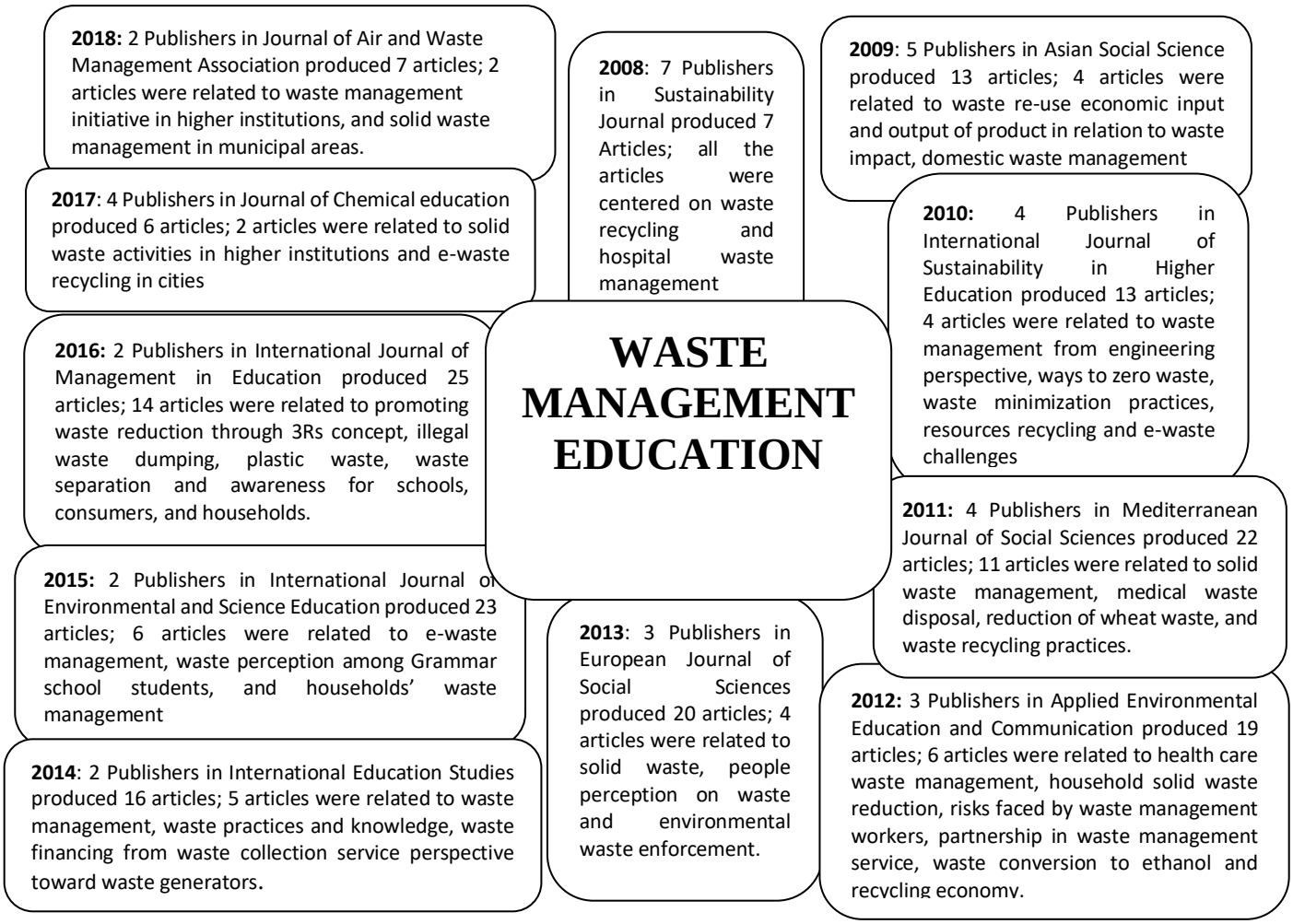

Fig. 1 Chart of Articles Publication that
is related to Waste Management Education

3. Results

This study is analysed based on the distribution of articles, source, common related issues in the selected articles. It covered articles related to the concept of 3Rs (Reduce waste, Re-use waste, and Recycle waste) and landfill. The kind of approach of the articles followed theoretical, practical or both

theoretical and practical issues. Distribution of the research design depends on quantitative, qualitative, and mixed methods. The outcomes of this study are comprehensively analysed.

3.1 The Distribution of Articles Depending on Years

The outcome of the results indicated a wide variation and unstable gap on articles publication that is related to waste management education. The illustrative graph below demonstrated a growing trend from 2008 to 2011; it depicted a bit of fall and steady growth between 2012 and 2013. While by the year 2014 the growth drop that looks steady dropped down to sixteen articles publication. On the years onward (between 2015 and 2016), the growth of articles publication soared from 23 to 25; there were growing years that launched the highest publication of articles compared to the past years. However, the growing trend falls in the year 2017 and a slight growth of seven articles in the third quarter of the year 2018 and still probably more articles are awaiting publication. Frankly speaking, 172 publication is abysmal compared to research strength globally. That should challenge research capability because the issue of waste globally is a serious challenge and threat. Especially to the developing countries that lack the facilities and finances to combat it, even a severe factor contributes to climate change. More research should be directed toward waste management education. See the comprehensive details on the graphical illustration below (Fig. 2). These statistics on articles relating to waste management education should awaken a sense of concern to scholars and academic communities' worldwide to reinforce research toward transforming the awareness, attitudes, behaviour, and manners of learners and the general populace on viable waste management [34]. The academic communities ought to reposition their activities by influencing the learners to make it an obligation and utmost priority to take care of the ecosystems and other vital bio-diversities. Research works focused on societal and environmental consequences of wastes generated by the people from foodstuff, power, electronics, notebooks, and other industrial discards either the decomposable or non-degradable substances. Thus, this aspect of studies must be encouraged and actualised while publishing academic journals [35].

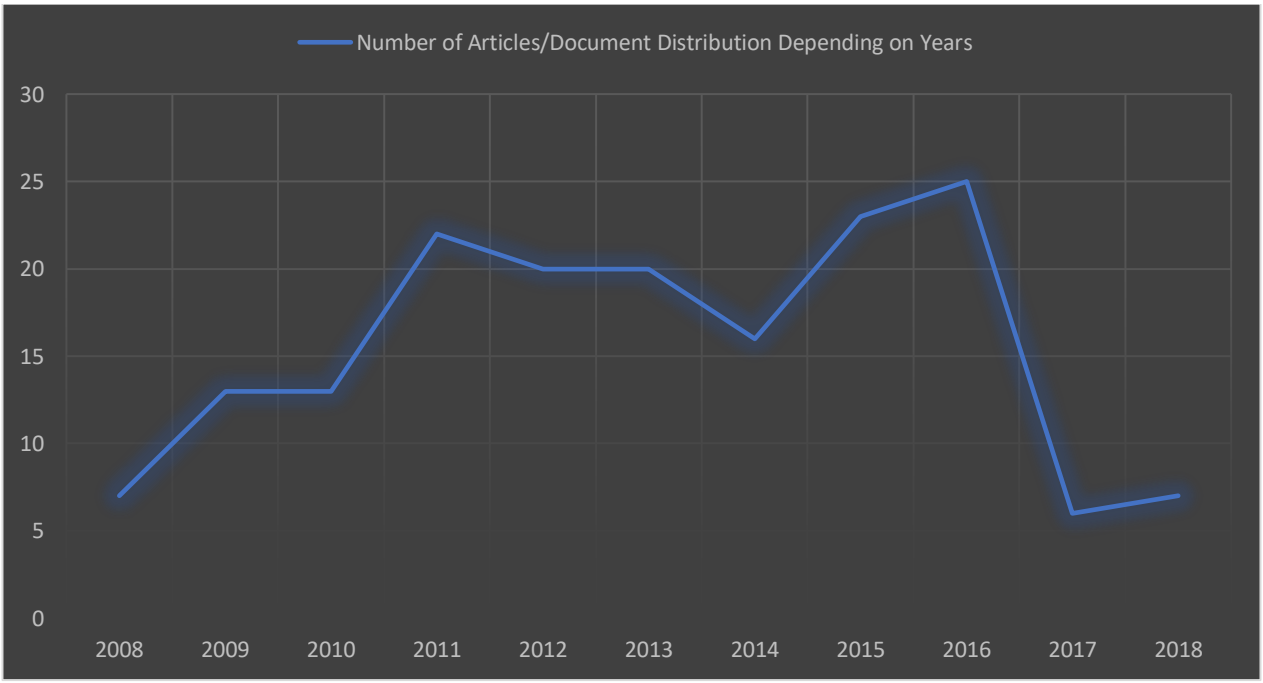

Fig 2. Showing the distribution of
articles depending on the years 2008-2018

3.2 The Distribution of the Articles Depending on Source

Out of 116 sources revealed by Scopus result analyses – only ten selected sources are displayed by line graph from 2008 to 2018 concerning articles coverage on waste management education, as shown in Fig 2. These were the identified journal source publication articles as thus – Sustainability Switzerland with 7 Publishers produced 7 articles in the year 2008; Asian Social Science with 5 Publishers produced 13 articles in 2009; International Journal of Sustainability in Higher Education with 4 Publishers produced 13 articles in 2010; Mediterranean Journal of Social Sciences with 4 Publishers produced 22 articles in 2011; Applied Environmental Education and Communication with 3 Publishers produced 19 articles in 2012; European Journal of Social Sciences with 3 Publishers produced 20 articles in 2013; International Education Studies with 2 Publishers produced 16 articles in 2014; International Journal of Environmental and Science Education with 2 Publishers produced 23 articles in 2015; International Journal of Management in Education with 2 Publishers produced 25 articles in 2016; Journal of Chemical Education with 4 Publishers produced 6 articles in 2017; Journal of Air and Waste Management Association with 7 Publishers produced 7 articles in 2018 accordingly.

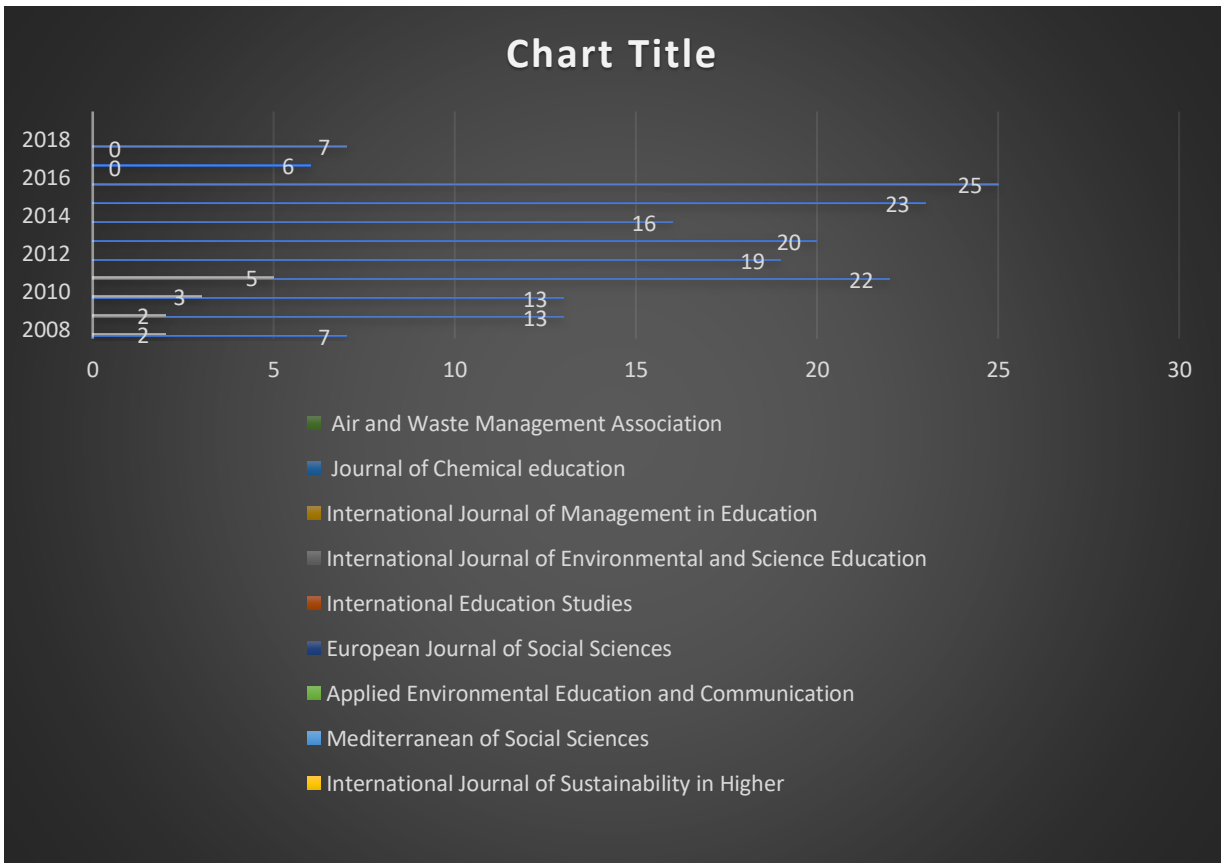

Fig 3: Showing the distribution of
articles depending on the source

So, the sum of 40 articles was revealed from 11 sources as acknowledged above (see details in Fig. 3). It includes the total sum of 116 sources. Out of the 172 published articles, 70 articles were related to current research for eleven years. The implications imply a low level of article publication from 11 sources. For instance, Sustainability Switzerland published seven articles (highest source of article publication). For eleven years, which equally shows low research frequency on waste management education. See the confirmed details in Fig 3. Our academic communities and research institutes should train the students, public, and reinforce funding of research. It takes a collective obligation to upsurge education, understanding, hi-tech know-how, and machinery a manageable ecosystem. These include creating academic and ideological structure within attainable teaching aims, empirical study, program generation, knowledge interaction, and public consciousness – toward viable posterity for the environment [36]. The global seminar held in France (1990) indicated ten programs of strategy. They initiated viable ecological education toward learning, empirical study, activities, and an institution of learning [37]. It revealed more than two hundred seventy-five Rectors across more than forty nations endorsed. The France Proclamation emphasises that environmental organisation of learning for protecting natural endowments, reprocessing discarded materials, cutting discarded materials, and social-ecological actions [38].

3.3 Common Issues in the Articles publication

In all the seven articles published in 2008, the common related issues focused on waste recycling; two articles related to waste matter. Thus, it compared the quantity of waste generated with the quantity of waste being recycled and clamoured for better environmental practices and sustainability and concerned with hospital waste management. In 2009, 13 articles published, and 4 of the articles were exclusively related to waste ranges from waste re-use, economic input, and output life cycle assessment in determining the waste impact, product lifecycle assessment and internal waste management accordingly. In 2010, 13 articles published, and 5 of the articles related to waste in the areas of waste management. In the year 2011, twenty-two articles related to solid waste management, medical waste disposal in developing nations, reducing wheat waste and waste recycling practices. In 2012, 6 articles out of 19 articles connected to waste especially on health care waste management, households' substantial waste reduction, risks faced by waste workers, partnership in solid waste management, and conversion of waste to ethanol and recycling economy concurrently. Also, in the year 2013, 20 articles were identified in the publication. Only four articles shared relevance with waste on solid waste, perception of people on waste and environmental waste enforcement; while in 2014, only five articles' publication connected to waste out of 16 articles published. It focused on waste management, waste practices, knowledge, and waste financing from the perspective of rendering waste collection services to waste generators. However, in 2015, 6 articles out of 23 articles focused on different waste matters like e-waste management, sustainable waste management, waste perception among grammar school students and households' waste management. The total sum of 25 articles was published in the year 2016, and 14 articles derived from the total sum were dedicated to promoting waste reduction through 3Rs concept, illegal waste dumping, plastic waste, and waste awareness for consumers and schools, waste separation from source programs and exposing the attitude of households' concerning waste. Finally, the closing year 2017 to 2018 revealed 6 and 7 articles publication respectively; and 4 out of it closely related to substantial waste activities in higher institutions, e-waste recycling among urban dwellers. It can make campus green through waste management initiatives in the higher institution. It also covered sustainable waste management in municipal areas (See details of articles related to waste issues and non-related articles to waste issues in Figure 4).

As mentioned earlier, the common issues on the whole 172 articles are that exclusively 70 articles between 2008 to 2018 conceptually connected to waste recycling, 3RS (Reduce waste, Re-use waste and Recycle waste). Municipal and domestic waste management, e-waste recycling and challenge, and product lifecycle; these include waste generated from production to final users, waste management and education in higher institutions and lower academic communities. Healthcare waste management, partnership and waste collection services to waste generators, risks involved in waste collection/service, people perception (in terms of knowledge, attitude, and practices) to waste, toxic waste pollution and plastic waste pollution. These are issues of grave concern, and it quite worthy of more attention and research. The number of articles (70) related to waste was not enough for a high pace of 11 years. Therefore, more related research on content analysis should emphasise and promote further research connected to waste management education. Thus, researchers must work on every aspect of human waste generation, either domestic or industrial waste, because of human waste administration. It advances beyond ordinary contamination reduction and regulation into various viable waste minimisation strategies through effective waste control education [39].

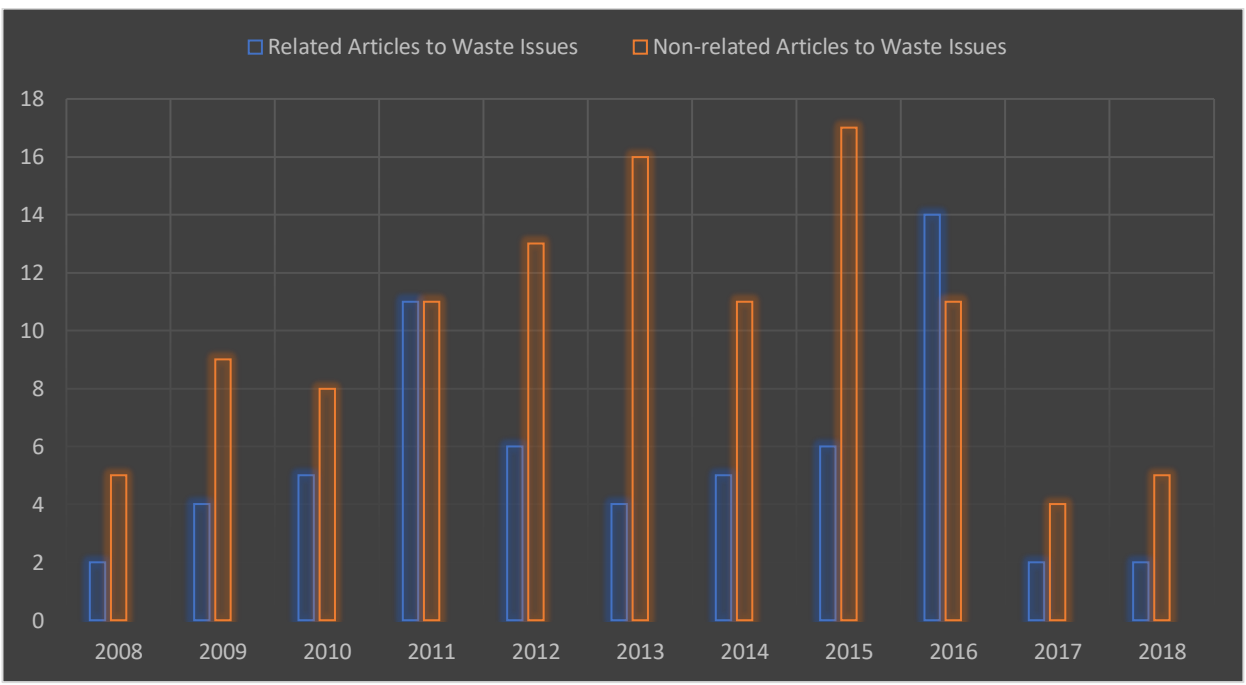

Figure 4: Showing details of Related Articles to Waste Issues and Non-related Articles to Waste Issues 2008-2018

3.4 Frequency of the Articles related to reducing waste, Re-use waste, Recycle waste and landfill

From the assessment of the 70 related articles on waste management education out of the total 172 articles in a catchment, only two articles (number four and number twenty-two on the table list of articles that mentioned) duly adopted the concept of 3Rs (Reduce waste, Re-use waste and Recycle waste). It ranked on a percentage rating and precisely 2.90% based on this summation (2/70 x 100). These results were insignificant and indicated a severe setback in applying 3Rs in waste management systems globally because of the research conducted in different countries. Most of the study articles

mainly centred on waste management in general, community and urban solid waste management, e-waste recycling, and medical waste management; without applying 3Rs waste management initiatives. Although some aspects of 3Rs like reducing waste and recycling waste mentioned, it lacks emphasis on the 3Rs concept; especially on most of the articles that championed the awareness message on waste management. Consequently, landfills were partially mentioned in all the general contents of the articles sampled. Virtually the critical message of waste management should focus on reducing waste at the final dumping ground for the continued extensive use of the landfill. Thus, the message of 3Rs and landfill should be well articulated, emphasised and promoted in any future research relating to waste management and waste education. Primarily, academic communities have been developing talented front-runners toward occupying a vital position to enhance viable waste administration. It supports continuous schooling program and research. We can say that prominent and brilliant students, teachers, and researchers emerging from these academic communities are the cause of our menace environmentally and health-wise [40]. This calls for more efforts from every member of academic communities particularly teachers, researchers, and research institutes to develop new programs in collaboration with learners, people in communities and Pro-environmental activists to expand the positive actions of viable waste administration called 3Rs strategies [41].

3.5 The Kind of Approach of the Articles Followed Depending on the Theoretical, Practical or Both Theoretical and Practical issues

Upon the framework of empirical assessment, the remaining 102 articles indirectly related to waste management education. These articles sorted out to determine their contents as it followed the direction of theoretical, practical or both theoretical and practical issues (see details in Figure 6). Five articles 2008 (in numerical order of 163 to 167) connected to the research work topic. The sampled articles (Number 163 and 167) covered management capability in elementary school, assessment of the past health practitioners on disease control and prevention in Nottingham (1873 to 1925), respectively; theoretically and practically related to the current study; while article Number 164, 165 and 167 practically related. The main message focused on the waste reduction concept initiated into the nursing program for second-degree students. The effects of urban expansion on medical infrastructures and community settings among Aboriginal and Non-Aboriginal in Australia accordingly. The year 2009 revealed ten articles (article Number 150 – 156, 158 to 161) that collectively addressed waste management relating to industrial ecology and product lifecycle management. Policies that promote management environmental associated problems, and cross-border issues such as health, waste management, security, and environment. It includes quality for general life supports the concept of economic input and output, product life assessment, teachings of environmental value to pupils, the impact of the environmental club among high school students, several ways of promoting ecotourism, and environmental sustainability management into higher institutions, respectively.

In the year 2010, 8 articles were noted (Number 139 to 145 and 148) and out of which 6 articles (Number 139 to 140 and 143 to 148) were evaluated to be practically connected to the issues of study as follows – climate change effects on environment and urban health, sustainable water management in Emory University (by cutting energy, reducing waste and using water-saving devices), mega technology that prone the environment and people to risks (like toxic waste disposal), design for the execution of environmental management system in higher institution in India using SWOT analysis (Strengths, Weaknesses, Opportunities and Threats) on issues (like energy efficiency, transportation and waste management), how high college uses waste management studies to engage in corporate social responsibility activities and using environmental education to achieve zero-emission system and minimise waste; while the other 2 articles (Number 141 and 142) were unrelated theoretically and

practically as they focused differently on bacterial contamination on mobile phones and sustainable education development in Poland. However, in the year 2011, 10 articles (Number 116, 118, 119, 121, 122, 124, 125, 128, 134 and 135) were identified and evaluated following to the direction of the research question (No 5); seven of the articles (Number 116, 119, 121, 122, 125, 134 and 135) were practically related as revealed in their contents of study as follows – efficient waste management system as tool to control rabies outbreak in India, involvement of environmental matter in every aspect of human life (such as religion, energy and water conservation, food consumption, waste administration and community activities), human factors as significant agents of global warming (such as food consumption, recycling, transportation and waste management system), factors that trigger students involvement in waste management activities, needs for sustainable environmental educators, impact of culture on human excreta management in Pakistan and sharp injuries control among health workers especially on hospital wastes; the remaining 3 articles (Number 118, 124 and 128) were practically and theoretically out of content of the targeted study in these directions – techniques and procedures of teaching organic chemistry among undergraduate students in laboratories, food policy in Canada and challenges of water basin management in South India.

As the year advances into the year 2012, thirteen articles (Number 95, 98,99,100, 101, 102 103 to 106, 108, 111 and 112) were noted and verified according to the scope of study, nine articles (Number 103, 104, 106 and 111) supported the direction of the research question from practical perspective as thus – disposal of tuberculosis sputum need the attention of waste management system, hygiene and waste management, developing environmental management model for medical centre, effects of urban climate change, private sector involvement in infrastructures delivery, developing an engineering education model that provides solution to many problems facing the world today, assessment of knowledge and behavior of physically challenged students on environmental matter (such as energy conservation, waste management, tree conservation and training), how environmental management system can be incorporated into chemical engineering education (such as waste management, pollution, water management etc.), training people on health, safety and environmental matters concurrently; while the other four articles (Number 100, 105, 108 and 112) were contrary to both practical and theoretical goals of study from these other perspectives – improvising source of water supply in remote areas to avoid plaque, developing a service that will prevent wastage of organisational resources in e-learning systems, managing university faculty in term of time management and assessment of disinfection and decontamination among students of dental postgraduate school in Wales respectively. Also in the year 2013, thirteen articles (Number 75, 76, 77, 78, 80, 81, 84, 85, 86, 88, 89, 90 and 93) were appraised on the basis of the postulated question but nine of the articles (Number 75, 76, 77, 81, 84, 86, 88, 89 and 93) acknowledged practically not theoretically nor both as revealed in the content as follows – laws of eco-city (such as ecological footprint, lowering quantity of pollution, well planned land-use system, compost used organic materials, recycling and minimising waste), assessment of hotel performance environmentally (in terms of environmental education and training of workers, complying with environmental rules, waste management and environmental social responsibility services), health infrastructures in comparison with carrying capacity (water management, waste management and other facilities in the city), managing livestock waste, using organic chemical means (to recycle waste), involvement of pupils in environmental sustainability, management of environmental costs from accounting perspective (costs of electricity, water, paper and waste generation in three universities system), household infrastructures (water, sewerage, roads, drainage and solid waste management) and environmental impact assessment like land-use, transportation, public health, waste management and infrastructures. Four articles (Number 78, 80, 85 and 90) were found unrelated practically and theoretically as follows – management of time in distance learning education, management of school safety in Thailand, using organisation principles and

strategies in school management system, attitude and knowledge of dairy farmers concerning houseflies accordingly.

In addition, twelve articles (Number 56, 57, 63 to 69 and 71 to 73) in the year 2014 were reviewed and assessed on the basis of their contents but ten of the articles (Number 56, 63 to 69 and 72 to 73) were in connection with the scope of study practically in the following areas – roles of retailers in sustainability such as reducing waste, inventory, transportation costs and affordable price to consumers, environmental practices, roles of smart phones in accessing environmental values and sustainability, disposal of specimen materials in higher institutions, creating environmental systems like water supply, electricity, waste management system, how to improve efficiency in an organisation (patient caring relation, team work, teaching and waste reduction), how to improve management processes in Quebec school, environmental practices in Brazilian University, town planning and controlling the pollution of Nano - materials in the environment and community respectively; while two of the articles (Number 57 and 71) were different in scope both practically and theoretically as follows – assessment of the knowledge of nursing students in infection control and controlling of violence in secondary schools. Hence, the year 2015 revealed seventeen articles (Number 33, 34, 36, 37, 39, 43, 45 to 55) and in which fourteen of the articles (Number 33, 34, 36, 39, 43, 45, 46, and 49 to 55) were practically related in the areas of waste disposal in a community, effects of excessive consumption, environmental sustainability such as water management, solid waste management and green practices, teaching environmental sustainability in schools, teaching assistant orientation, sustainable ways of managing environment, school safety management (waste disposal practices, pesticide and fertiliser control, water resources and disposal of used motor oil), integration of environmental education, test of social responsibility among students in Malaysia, psychiatric education (avoid waste of resources), marine debris as agent of pollution, sustainable education among teachers and students and transformation of dairy production (sustainable principles, new technology and waste management concepts); while the three linger articles (Number 37, 47 and 48) were practically and theoretically deviated from the main subject of study as follows – time management among teachers and students, assessment of decontamination skills among nurses and assessment of public health research in Sudan. Entering into the year 2016 publication, eleven articles (Number 9, 15, 16, 17, 20, 26, 27, 28, 29, 30 and 32) were comprehensively identified and evaluated in accordance to the scope of study; seven of these articles (Number 9, 17, 26 to 28, 30 to 32) were most practically associated with the main subject of the study as follows – how health facilities and unemployment ranked above environmental issues (such as solid waste, coastal degradation, and land degradation), green economy (issues on environmental protection and waste management), storm waste management, oil pollution and the environmental impacts, sustainable management in higher institution (waste recycling etc.), water quality assessment in relation with organic waste removal from stream water and tourism activities in community settings (issues on waste disposal and their impacts); four of the articles (Number 15, 16, 20 and 29) were practically and theoretically unrelated to the sets goal of the study as follows – hazard analysis of medical facilities in term of costs, disasters management among health practitioners, domestic biogas initiatives and controlling wastage of resources in higher institution. According to the year 2017 and 2018 publication, six articles (Number 1, 6, 169, 170, 171 and 172) were sorted out and reviewed. However, three of the articles (Number 6, 169 and 171) follow the research direction practically. Thus, physical facilities management in university campus (waste, water, electricity, and sports facilities). The other article (Number 1) was practically and theoretically unrelated to the ongoing research as follows – time management in the school system. Researchers should be more practical and theoretical in their approach to waste-related discourse. It will create a diverse way out for waste challenges through efficient-hi-tech machinery. It is a constructive reformation of waste generators attitude, knowledge, and manner as appropriated across all nations of the globe [42]. Based on the outcome of the article's

survey, most of the article's publication is practically oriented than being non-theoretical and practical; but with no record of articles tailored toward theoretical approach. Theoretically and practically, it contended that the Western World schooling system devalued native customs and understanding, thereby endorsing low self-esteem among the developing world. It triggers toward attaining the aim of the Western World environmental advancement through adequate waste management education and other valuable related environmental programs. Native schooling system teaches nature and its embodiments as a culture that everybody must imbibe in society, particularly by learners from different learning institutions [43]. The theoretical approach to the issue on waste management education is fundamental: because several notions have narrated the mannerisms that are associated with the people and the events in their environment; also ecological crises influence the internal programs which include power generation and transportation programs; people of different nationalities worldwide seem to be raising vital discussion on issues affecting our environment while the situation lacks concern and corporate responsibility from the people [44] [45].

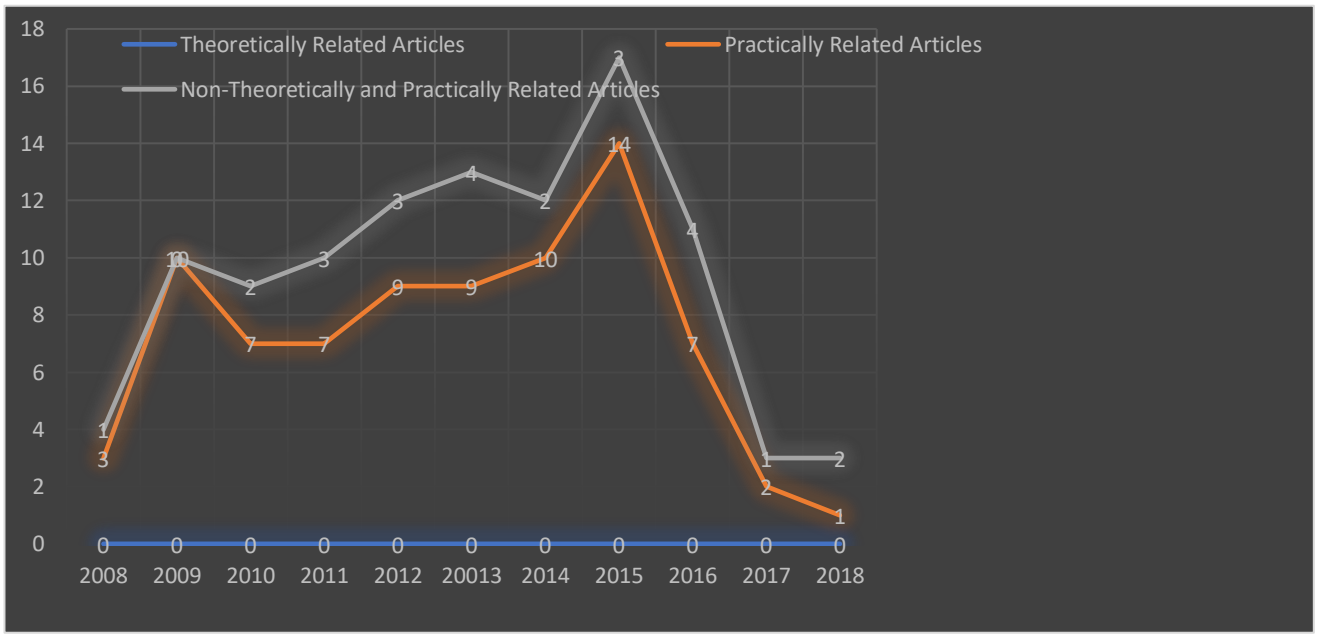

Fig 6. Approach of Articles Depending on Theoretical, Practical and Non-Theoretical and Practical Issues

3.6 Distribution of the Research Design Depending on Quantitative, Qualitative and Mixed Research Methods

This study has evaluated and explicitly analysed 70 articles published on Scopus's website connected with waste management education; different areas and issues on waste matters as discovered in Scopus search attested to the content of this study. The significance of this study attributes is successfully evaluated through the concept of qualitative content analysis. This study fundamentally relied on the evaluation of the existing researchers about waste management and waste education. After a detailed assessment of 70 articles based on research design, the results revealed that 29 of the articles quantitatively researched. Another 29 articles differently followed the direction of qualitative research.

In contrast, 12 articles followed mixed research approaches (both quantitative and qualitative research methods).

About 102 articles were practically related and theoretically unrelated, 65 and 23 of the articles followed qualitative, quantitative research. Fourteen of the articles add up as mixed research. Thus, qualitative research articles dominated all the articles. It published with the value number of 96, quantitative research articles rated for 50 and mixed research articles rated for 26 (see details in Figure 7). Fundamentally, all works of research ought to explore all the three research methods: the results of various studies relating to waste, environment, and people often connected to a specific aim, research question/hypothesis and research techniques, which at the end revealed the possibility and variability of ecological understanding, attitudes and manners, level of social responsibility, value, and awareness of the respondents [46] [47]. The explanations behind this notion are mostly found in the postulation, which stated that reform in ecological understanding and perception possibly results to reform in biological activities without any mannerisms reform representations. It established both qualitative and quantitative or by mixed research methods [48].

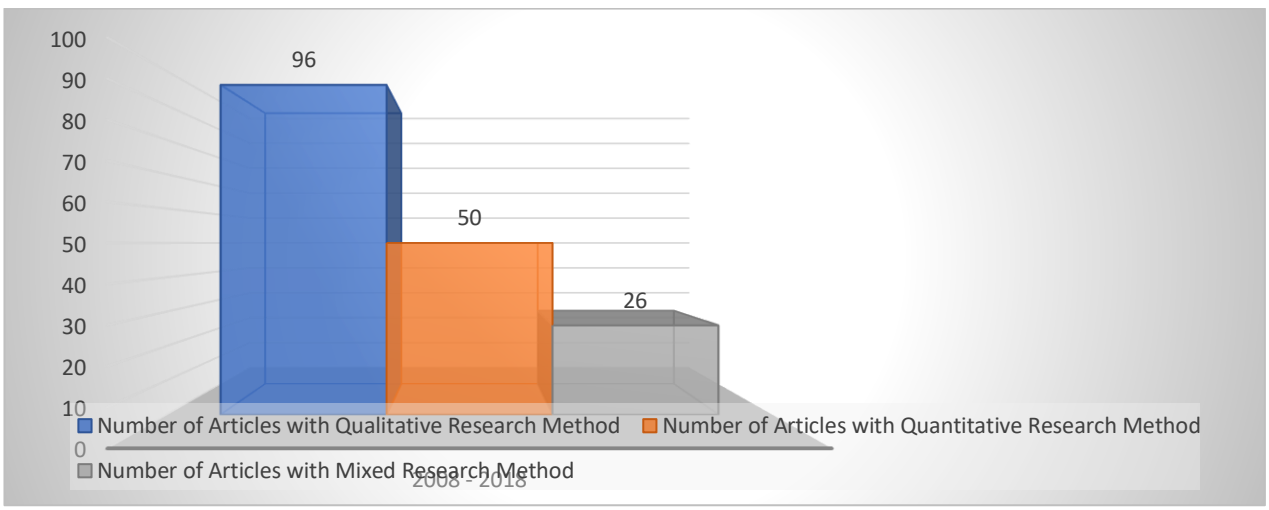

Fig 7. Showing Distribution of the Research Design Depending on Quantitative, Qualitative and Mixed Research Methods

4. **Discussion**

This research investigated and evaluated 172 articles but exclusively 70 articles from different journals that focused on waste management education. It ranges from Sustainability Switzerland to Asian Social Sciences, International Journal of Sustainability in Higher Education, Journal of Chemical Education, Mediterranean Journal of Social Sciences, Applied Environmental Education, European Journal of Social Sciences, International Educational Studies, International Journal of Environmental and Science Education and International Journal of Management in Education. This research is perpetual, with the current research works on waste matters. Scopus website publication comprises so many journals that are widely used and read by various scholars and academicians. It is pertinent to declare that journals covering social sciences relating to humanities and environmental issues were strictly the only source of data for this present study.

Firstly, content analysis disclosed that the distribution of articles yearly varies in the growth of articles published from 7 to 13, 13, 22, 20, 20, 16, 23, 25 and 6 articles from 2008 to 2017. The highest growth of articles publication was recorded in 2016 while the second peak growth recorded in 2015. It downturned to 16 articles in 2014 and geared up slightly and stabilised with a drop from 22 to 20 articles between 2011 and 2013; the publication dropped drastically in 2017 and 2018 to six and seven articles accordingly. This fluctuation in articles publication trend could influence by the lack of grants and supports toward research, and insufficient attention given to waste matters. The result indicated the absence of adequate scholars and promoters of research works regarding waste management education [49]. It resulted in a severe setback of active publication regarding the theme of study for eleven years; thus, more research ought to promote in this direction.

Secondly, the content analysis revealed that the distribution of articles depending on source has been too low, considering the numbers allotted to various sources. Articles coming from these identified sources were inadequate to be considered internationally and yearly for the pace of 11 years. Thus, research needs stirring from every known source. It promotes knowledge development in academic communities and fosters quick solutions to various waste problems facing human societies. These vividly emphasised various sources of article publication on environmental matters should work actively towards promoting research works. The waste reduction and education accelerate sustainability worldwide; waste cutting awareness is crucial for a possible living standard [4].

Thirdly, content analysis unveiled common issues on the articles published from 2008 to 2018. It ranges from 3Rs (Reduce waste, Re-use waste and Recycle waste) to waste recycling, waste re-use. It also covered product lifecycle assessment, household waste management, waste management from an engineering perspective, waste minimisation practices, plastic waste, toxic waste, solid waste management in municipal areas and healthcare waste disposal. Regardless of the commonality associated with the various articles published on waste matters, managing of wastes generated by humans have been aiming majorly on separating dangerous or toxic wastes accumulated in the communities where people reside due to the ecological, societal, epidemic, and economic consequences that may eventually emerge [50] [51].

Fourthly, the content analysis also revealed less attention and emphasis given to 3Rs and landfill according to the percentage rating (2.90%) of 66 related articles on waste management education. These areas are where more publicity and consistent waste education must be duly emphasised. Most of the articles treated this matter on a peripheral level – which is what every society and its people needed at this age of waste challenges. The concept of 3Rs showed waste generators obligation. It evaluates the product life cycle to the final end-users; waste generators must abide by rules. Food production and feeding should channel toward viable waste cutting [52] [53].

Fifthly, content analysis disclosed that out of 102 articles found unrelated directly to the research topic, 70 of the articles identified and critically evaluated to be practically related to the study's scope. In comparison, the remaining 34 articles were both practically and theoretically not related to the study's scope. From both the perspective of theory and practical, societal, and human ecological philosophies have supported and contended that people's understanding of ecological issues balanced with the reform in perceptions, enthusiasm due to some incentives and manners [54]. This recent study revealed a severe wide opening between the practical and theoretical approach indicated by many articles related to waste management education.

Finally, the current study on content analysis assessed critically. It concluded upon the premise that 29 articles were quantitative, 29 articles were qualitative, and 12 articles were mix researched. It implies that all the articles influence both research methods and found wanting based on the mixed research technique application. Using any one of the research methods stated above may affect respondents' opinion physically and socially. These may also influence the people to query research methodology

tools toward the environment and its endowment. The research techniques enlighten the researchers and instructors on the most efficient ways of educating and influencing people perceptions and understanding practically and morally [43].

5. **Conclusion**

This research aimed to analyse articles covering 2008 to 2018 on waste management education in the Scopus website's mixed journals. Precisely 172 articles were appraised accordingly, based on the distribution of articles depending on years, distribution of articles depending on the source, common related issues on articles publication, how many of the articles related to 3Rs. Landfill and the articles' approach depend on theoretical, practical, or theoretical and practical issues. The research design distribution depends on quantitative, qualitative, and mixed research methods. All those, as mentioned earlier, were evaluated from the perspective of content analysis. The outcome of the content analysis shows that there was an unsteady trend of articles distribution yearly. There was a low turnout of articles publication from different sources, articles commonly related to solid waste management, recycling, 3Rs, landfill and healthcare waste management. Thus, more research works through scholars and academicians should be channelled and reinforced toward waste management education.
Scholars and institute of research development and other research funding agencies should also extend their research needs and grants to waste management education. Research works should be added up conceptually in the area of waste administration – so that study could systematically and empirically establish. The essence of waste reduction and waste education reinforced among various waste generators; the rules and activities regarding waste reduction acknowledged and initiated. However, there is a lot to study concerning the cutting of discarded materials. It requires a highly skilled management system to eradicate waste accumulation epidemic among humans across the globe. Awareness and enthusiastic, forthcoming events and encouragements occupied a vital position in how discarded materials could minimise significantly. Therefore, these matters must be considered and collaborated into waste management educational programs, to attain the viable and healthy standard of living in the environment

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