International Journal of Trends in Mathematics Education Research
Vol. 5, No. 3 (2022), pp. 315~327
ISSN 2621-8488 (online)
DOI: https://doi.org/10.33122/ijtmer.v5i3.120

Research Article

# Development of a motivational-base for household waste management training model

**Yayan Sudrajat**✉

Departement of Indonesian and Literature Education, Indraprasta PGRI University, Jakarta, Indonesia, 12530
✉Corresponding Author: kang.iyan76@gmail.com | Phone Number: +628121985317

*Received: 14 July 2022* *Revised: 27 August 2022* *Accepted: 15 September 2022* *Available online: 30 September 2022*

## ABSTRACT

The study objective is to develop a motivation-based training model in household waste management which will result in the development of a conceptual model, the development of a procedural model, and the development of a physical model. Research and development methods (R & D), a combination of the Borg and Gall development model, the Dick and Carey learning model, and the Keller Motivation Model. The instrument is validated by the validator, then the instrument that has been validated will be used for the feasibility of the product to be tested by experts consisting of instructional design experts, curriculum experts, training material experts, and instructional media experts for the feasibility of research products. Then the product was tested on several prospective trainers through one-to-one trials, small group, and field trials. The results of research by instructional design experts, training material experts, curriculum experts, and instructional media experts state that it is very good and feasible to use motivation-based household waste management training with the name SPIRIT Training Model to increase the motivation of prospective trainers in household waste management training activities so that can reduce household waste in Indonesia.

**Keywords:** motivation; household waste management; training model; development model

## 1. INTRODUCTION

The population of Indonesia based on the results of the population census (SP2020) in September 2020 recorded a population of 270.20 million people. (BPS, 2020) and the increasingly rapid rate of industrial growth has an impact on the amount of waste produced, including plastic waste, paper, packaging products containing B3 (Hazardous Toxic Materials). The amount and type of waste, very much depends on the lifestyle and the type of material we consume, the more the economy increases in the household, the more varied the amount of waste produced. In addition to these conditions, there is still waste generation or disposal in the river so that it has a negative impact on the environment which ultimately disrupts human health. The presence of waste is one of the problems faced by the community. The presence of waste is undesirable when associated with factors of cleanliness, health, comfort and beauty *(aesthetics).*

Household waste management must be carried out seriously and correctly so that careful planning is needed in the form of training teaching material outputs to create educated and skilled personnel in household waste management so that it can be an outcome that can be added value in everyday life. Garbage if not managed properly will cause various problems, including aesthetics, health, and potential environmental disasters. From the data and calculation of human resource requirements in household waste management above, a training program for household waste management is needed in order to master the skills and techniques of good household waste management. Pragmatically, the household waste management training program has a positive impact on both individuals and organizations aimed at increasing the mastery of skills or skills received by individuals, training provides reinforcement for individuals by providing guarantees job security based on mastery of the required competencies. The preparation of training programs should be carried out to address certain problems that will contribute to achieving its objectives. The training is not a program to spend the budgeted funds or even just to entertain the trainees even though there is an element of entertainment in the training. The training program should be a structured activity that must be able to provide addedvaluefor the organization.

Training needs analysis is carried out through a question-and-answer process *(asking questions getting answers).* Questions are asked to each prospective trainer and then verification and documentation of various problems is made where the training needs are identified to solve these problems. In order to achieve the goal of household waste management training, it is necessary to develop a training model. In developing the training model, it is necessary to use several principles that serve as a reference so that the resulting training meets the expectations of stakeholders, including prospective trainers, parents, community users of education and training graduates, and the government. These principles include: the principle of goal-oriented, the principle of relevance, 7 principles of effectiveness, the principle of efficiency, the principle of continuity,

the principle of flexibility, and the principle of integration. Recognizing the importance of the role of prospective trainers as learning agents in the implementation of motivation-based household waste management training, increasing pedagogic and andragogic competencies needs to be maximized through effective and effective ways. One of the alternatives is to develop a training model for household waste management. This household waste management training is still based on the behavior of the objectives and the learning process that focuses on outcomes or behavior usually guides learning and assessment of measurable results in each of the general education and training objectives.

The Household Waste Management Training Model (PSRT) was designed through the Borg and Gall research model. The first step, the Dick, Lou Carey and Carey system learning model, steps 1 to 7. However, in the seventh step, the learning strategy of this training model uses the ARCS model. so that later a sequence method will be made to be able to proceed to the Dick, Lou Carey and Carey model. with several models to be understood by prospective trainers so that they can be relevant to the times through instructor handbooks, motivation-based training teaching materials. This training model is called the SPIRIT training model because it uses the ARCS method which aims to increase the motivation of prospective trainers in participating in household waste management training activities (PSRT).

Based on the development process, research resulted in the form of a household waste training model equipped with an instructor handbook and training teaching materials. The urgency of making the training model, because it is related to the map of potential areas to form the PSRT training model, is carried out at the Kompos Academy, Pesanggrahan South Jakarta and the Camik Indonesia Center Foundation, Depok, West Java. This selected place was carried out through preliminary research using a needs analysis of the implementation of household waste management training based on the initial conditions of the prospective trainer, the readiness of human resources at the research site, the level of education of the prospective trainer, the experience of training the prospective trainer. As for the preliminary research at the institutional level, the research results obtained are in the form of the availability of instructor handbooks and training teaching materials that they do not have systematically, so that after seeing the initial conditions the researcher offers a suitable training model to be carried out in that place.

## 1.1 Household Waste

The increase in population, socioeconomic, and technology will affect people's behavior/lifestyle and consumption patterns. These changes will also affect the volume, type, and characteristics of the waste generated. Even this uneven development between rural and urban areas will affect the concentration of the population in an area, namely urban areas, and result in the concentration of sources and waste generation in urban and buffer cities. The presence and presence of household waste is one of the problems faced by the community, especially if it is associated with factors of cleanliness, health, comfort and beauty (aesthetics). The high escalation of urbanization, makes local governments are required to improve maximum services in order to meet the needs of the community. One of its services is the prevention of the cleanliness of the residential environment. As a result of the demands and aspects of services that must be provided, local governments must be more serious about the waste problem. The issue of waste is endless to discuss, because it is related to the lifestyle and culture of the community itself. Therefore, waste management is not only a matter for the government, but its handling requires broad community participation. Population growth and changes in people's consumption patterns lead to an increase in the volume, type, and characteristics of waste that are increasingly diverse.

Garbage is the residue of human daily activities and/or natural processes in solid form consisting of household waste and household waste (Perda Bogor, 2012). Accordingly, according to (Law Number 18, 2008) chapter one article 1 waste is the residue of human daily activities and/or natural processes in solid form. In general, people recognize waste as something that is produced from various objects that have been used and are no longer needed by humans. According to (Slamet, 2002:73) waste is everything that is no longer desired by the owner and is solid. In line with this opinion, the notion of waste is the residual result of a product or something that is produced from the remnants of use whose benefits are smaller than the products used by its users, so that the results from this residue are discarded or not reused (Widawati et al., 2014). :120). Meanwhile, another definition of waste is solid or semi-solid waste material produced from human or animal activities that is disposed of because it is not wanted or is not reused. Yustikarini et al., (2017:178). In line with some of the opinions above, according to Rizal (2011: 146) waste is all types of objects or building materials/human, animal or plant waste or originating from activities of human life in fulfilling their daily needs which can cause and or result in contamination of water. , soil and air so that it can cause damage to the human environment.

While the definition of waste and waste is different, according to the KBBI accessed on 03/02/2021 at 02/30 on thepage https://kbbi.web.id/sampah, garbage has the definition of goods or objects that are thrown away because they are no longer used etc; dirt such as leaves, paper. Meanwhile, waste has 3 (three) definitions, namely:

1) The rest of the production process
2) Materials that have no value or are of no value for ordinary or primary purposes in manufacture or use: factories pollute water in the surrounding area;
3) Goods are damaged or defective in the production process.

Organic waste or biodegradable waste is usually the largest part of household waste. The behavior and awareness of the community as well as the limitations of waste disposal services make some shops, workshops, households, hotels, offices and other sources of waste dispose of waste in inappropriate places such as rivers, seas, vacant land alongside roads and so on side of the road and so on the side of the road and so on the side of the road and so on. In addition, based on Government Regulation number 81 of 2012 that household waste is waste that comes from daily activities in the household that does not include feces and specific waste. Likewise, household waste is unwanted material (which must be disposed of), produced in the kitchen or by other household or home activities. (Oghenejoboh et al., 2007:113).

Based on the various opinions about waste, the researcher concludes that the definition of waste is the residual value of an object/item that has no benefit and value unless it can be managed and processed properly by distinguishing between organic waste (wet waste) and non-organic waste *(dry waste).* valuable goods. In line with that, the researcher concludes that the definition of household waste is waste that comes from families living in people's homes in the form of organic waste such as: rice, fruit peel vegetables, rotten fruit and vegetables, tea/coffee dregs, animal carcasses, and animal dung. man. While examples of non-organic waste are crackle bags, mineral water bottles, drink cans, gadget cables, light bulbs/lights, glass, iron, and plastic. Then the researcher also concludes that the definition of waste is the processed residue of a product that cannot be reprocessed and must be disposed of because the utilization value of the product no longer exists. can cause negative impacts such as household waste is waste generated by one or several families who live in a building or dormitory located in a village or city.

## 1.2 Types of Waste

### *Organic Waste*

Organic waste has the largest percentage of total waste production compared to non-organic waste and waste containing hazardous waste, but organic waste can be processed by composting techniques and the high percentage of waste Organic waste is caused by the composition of the waste source which is dominated by household waste by 43.4% (Meidiana & Gamse, 2010:202). According to Wahyuni, et al., (2019:51) Organic waste is goods that are considered unused and discarded by the owner/user before, but can still be used if managed with the right procedures. Celik, et al added from their research that the components of waste that require priority attention in Asia are organic and paper. (Celik et al., 2018:5). In line with this, the results of Miezahresearch in Ghana stated that the high organic waste in Ghana's waste stream could be due to its high dependence on agricultural products. (Miezah et al., 2015:23). Meanwhile, Damanhuri explained the definition of organic waste as waste that is rapidly degraded (rotten quickly), especially from food scraps. In line with that, Jefrey et al., (2019:258) also define organic waste as residual waste that can still be decomposed into materials suitable for use again, which can be decomposed even if left alone, this waste will disappears by itself. Examples include food scraps, fruit peels, waste from the kitchen. Its utilization can be used as animal feed, biogas and others. So, it can be concluded that organic waste is rotting wet waste that interferes with beauty, worsens environmental sanitation, and increases respiratory problems but can still be decomposed sourced from households in the form of food scraps, vegetable residues, fruit peels that can still be processed into other forms for get added value from the wet waste. Wet waste can also be sourced from plantations such as leaves, twigs, tree roots, etc.

### *Non-organic Waste*

Damanhuri & Padmi (2010:17) defines non-organic waste as dry waste that does not rot or refuse generally consists of paper, metal, plastic, glass, glass, and others. Dry waste *(refuse)* should be recycled, if not then another process is needed to destroy it, such as burning. However, the burning of refuse thisalso requires further handling, and is a potential source of problematic air pollution, especially when it contains PVC plastic. In contrast to the opinion above, Dermawan et al., 2018: 88) defines non-organic waste as waste including various types of glass, metal, plastic and so on which can be destroyed and which cannot be destroyed by microorganisms, including non-organic waste, for example waste. leftover used cars, glasses, and so on. Non-organic waste is dry waste of various types, namely paper, plastic, iron, glass and cloth. Paper can include white, frosted HVS paper, cardboard, cardboard, colored paper (eg brochures/leaflets). Likewise, plastic can be distinguished, for example, crackle plastic, plastic bottles with different types of plastic. For B3 waste (Toxic and Hazardous Materials), which are often produced in households are light bulbs/fluorescent and batteries. (Widiarti, 2012:104). In line with that Santoso et al., (2021:21) define non-organic waste as waste that is not produced naturally by living things and requires a long time or even cannot be degraded naturally such as: styrofoam, plastic, cans, and glass or glass materials. One use of non-organic waste is by recycling(recycle). So, it can be concluded that non-organic waste is dry waste that cannot be degraded naturally but can still be used as an economic value by recycling.

## 1.3 Impact of Household Waste

Garbage comes from residential, institutional, commercial industry, agriculture or even industry while municipal waste has emerged as one of the biggest hazards it poses (Abur et al., 2014:5). Hazards caused by waste will pollute the soil causing nitrite contamination as a cause of nervous disorders. (Nizar et al., 2018:3). Garbage can cause soil, water and air pollution. Garbage that is difficult to decompose will cause soil pollution, while burned waste will produce gases that can pollute the air and seepage water from the decomposition of waste will cause water pollution. Garbage is very dangerous for human health and the environment. Therefore, waste must be processed or recycled properly so as not to pollute the environment and interfere with human health. Garbage that we have been throwing away so far, it can still be reprocessed, among others, in the form of handicrafts that have economic value, have artistic taste and are unique. In general, waste management is carried out in three stages of activity, namely: collection, transportation, and final disposal/management. At the final disposal/management stage, the waste will undergo certain processes, either physically, chemically, or biologically. (Sulistiyorini et al., 2015:77). The direct impact of waste on health is caused by direct contact with the waste, for example, toxic waste, corrosive waste to the body, carcinogenic, teratogenic and others. Indirect effects can be felt by the community due to the process of decay, burning and waste disposal. Waste decomposition can occur aerobically, continued facultatively and anaerobically when oxygen is depleted. Anaerobic decomposition will produce a liquid called Leachate along with gas. According to (Gelbert, et.all., 1996) there are three impacts of waste on humans and the environment, namely:

a) Impact on Health Inadequate location and waste management (uncontrolled waste disposal) is a suitable place for several organisms and attracts various animals such as flies and dogs which can transmit disease. Potential health hazards that can be caused are as follows:
   1) Diarrhea, cholera, and typhus spread quickly because viruses that come from garbage with improper management can mix with drinking water. Dengue *(haemorrhagic fever)* may also increase rapidly in areas with inadequate waste management.
   2) Fungal diseases can also spread (eg skin fungus).
   3) Diseases that can spread through the food chain. One example is a disease transmitted by tapeworms *(taenia)*. These worms previously entered the digestive tract of livestock through their food in the form of food waste/garbage.
   4) Toxic waste: It has been reported that in Japan approximately 40,000 people die from consuming fish contaminated with mercury (Hg). This mercury comes from garbage dumped into the sea by factories that produce batteries and accumulators.

b) Impact on the Environment Waste seepage liquid that enters the drainage or river will pollute the water. Various organisms including fish can die so that some species will disappear, this results in changes in biological aquatic ecosystems. Decomposition of waste dumped into water will produce organic acids and organic liquid gases, such as methane. In addition to smelling bad, this gas in high concentrations can explode.

c) Impact on Social and Economic Conditions.
   1) Poor waste management will create an unpleasant environment for the community: bad smells and bad views because garbage is scattered everywhere.
   2) Has a negative impact on tourism
   3) Inadequate waste management causes low levels of public health. What is important here is the increase in direct financing (to treat the sick) and indirect financing *(no work, low productivity)*.
   4) Disposal of solid waste into water bodies can cause flooding and will have an impact on public service facilities such as roads, bridges, drainage, and others.
   5) Other infrastructure can also be affected by inadequate waste management, such as the high cost of water treatment. If garbage collection facilities are lacking or inefficient, people will tend to throw their garbage on the street. As a result, roads need to be cleaned and repaired more often.

Besides having a negative impact on the environment, waste can also bring huge economic benefits if managed properly. One example is recycling waste into compost so that it can increase people's income. Garbage has a very large contribution to people's income if the waste is managed properly. Garbage at the Bantar Gebang TPA, Bekasi is able to provide business opportunities for scavengers, where the daily turnover reaches Rp 1.5 billion per day. If compost production from waste is carried out optimally through an integrated manufacturing system, the waste processing business can generate foreign exchange of IDR 7.62 billion per day. In a year this business can generate 2.78 trillion rupiah or more than 20% of the DKI Jakarta APBD. In addition, the location of waste disposal also has a double effect with the emergence of motorcycle taxi businesses, bus transportation, stalls and even gold traders at waste collection locations.

## 1.4 Management of household Waste

The phenomenon of waste in Indonesia is very difficult to eliminate, but this will not be long if everyone is aware and understands the impact of waste. Waste has become a national problem so that its management needs to be carried out in a comprehensive and integrated manner from upstream to downstream in order to provide economic benefits, be healthy for the community, and safe for the environment, and can change people's behavior. So far, waste management has not been in accordance with environmentally sound waste management methods and techniques, resulting in negative impacts on public health and the environment. Waste management requires legal certainty, clarity of responsibilities and authorities of the Government, regional government, as well as the role of the community and the business world so that waste management can run proportionally, bowl and share. The main problem around waste is that one cannot manage it unless one measures it properly. Garbage must be managed properly to a minimum so as not to disturb and threaten public health. Good waste management is not only for the sake of health, but also for the beauty of the environment. Waste management includes collection, transportation, up to the destruction or management of waste in such a way that the waste does not disturb public health and the environment. According to Annihayah, (2006; 23), Handling the waste problem is not easy because it is very complex including technical, economic, and socio-political aspects. From the technical aspect, it can be explained that waste management includes 5 phases, namely:

a. Shelter Stage: The community collects their own waste in the trash can.
b. Waste Collection Phase: Garbage collection from waste-producing environments, for example: residential areas, markets, trade centers, offices/schools and protocol roads
c. Waste Transfer Phase: there are three ways of moving, namely Temporary Shelters (TPS), Containers, and Depo Transfers.
d. Transport Phase: Transporting waste by garbage truck from temporary tanks to TPA
e. Final Disposal Stage (TPA): The stage of destroying waste at the final disposal site.

Based on the economic aspect, the explanation of the waste problem relates to the issue of comparison between the inputs for the waste retribution applied to the output issued by the local government to manage waste. Meanwhile, from the socio-political aspect of waste management, it will be related to the problem of relations or cooperation between local governments in dealing with waste, because realistically it is impossible for local governments to handle problems on their own without cooperation with other regions. Solid waste management is the process of collecting, storing, treating and disposing of solid waste in such a way that it is not harmful to humans, plants, animals, ecology, and the environment in general. (Agwu, 2012:87). Waste management is very important and needed by the community. It not only helps maintain environmental conditions, but also creates new jobs for the community. According to Nizar et al., (2018:11) waste management activities can be carried out through a system that can manage various types of waste and to create a green environment. Waste reduction can be done with the green packaging program.

The development of technology for waste reduction and handling is still lacking in Bengkulu City. Facilities for waste management in each RW/RT are also inadequate. Coordination between the community and the government regarding waste management has not been optimal, this can be seen from the lack of government socialization. There is no firmly enforced norm that regulates waste management only in the form of an appeal. Sanctions/penalties for violations of waste management have not been implemented in accordance with applicable laws and regional regulations. Funding for waste management comes from non-governmental organizations in Bengkulu City only for the transportation of waste. Community participation in waste management is the willingness of the community to help the success of the waste management development program in accordance with everyone's abilities without sacrificing their own interests. Without the participation of the community, all the planned waste management programs will be in vain. One of the community approaches to be able to assist government programs in success is to familiarize the community with behavior that is in accordance with the waste program, namely changing public perceptions of orderly, smooth and equitable waste management, changing people's habits in poor waste management and social factors, structure, and local culture.

## 1.5 Development Model

### *Dick and Carey*

The principles of the model include: a learning model that views the learning process as a learning system, the components involved in this model include: learners *(learners),* teachers *(instructors)*, teaching materials, and the learning environment, this model is based on solving models. system in elements or components in smaller procedure stages, teaching is aimed at the abilities and knowledge being taught. Teaching is given in suitable conditions to achieve the set learning objectives. made a significant contribution to the field of instructional design by championing a systems view of teaching, in contrast to defining instruction as the sum of isolated parts. This model addresses instruction as a whole system, focusing on the interrelationships between context, content, learning and teaching. Components such as instructors, students, materials, learning activities, delivery systems, and learning and environmental performance interact with each other and work together to realize the desired learner learning outcomes (Dick et al., 2015:88).

### *Borg and Gall*

Educational research and development (R & D) is process used to develop and validate educational products. The steps of this process are usually referred to as the R & D cycle, which consists of studying research findings pertinent to the product to be developed, developing the product based on the finding, field testing it in the setting where it wil be used eventually, and revising it to correct the deficiencies found in the field-testing stage. In indicate that product meets its behaviorally defined objectives. (Borg et al., 2007:337). Borg & Gall,Serangkaian tahap yang harus ditempuh dalam model Borg dan Gall yaitu “research and information collecting, planning, develop preliminary form of product, preliminary field testing, main product revision, main field testing, operational product revision, operational field testing, final product revision, and dissemination and implementation” (Borg et al., 2007:390).

### *ARCS (Keller, 2010)*

ARCS is an acronym for: *Attention, Relevance, Confidence, Satisfaction*. ARCS as a training design model was developed by Keller as an answer to the question "how to design learning that can affect achievement motivation and learning outcomes". The ARCS model, a motivation-based training design model, is rooted in many theories and concepts of motivation, one of which is the expectancy-value theory. Motivation has a broad meaning in what people want, namely about what they choose, what to do, and why they should do it (Keller, 2010; 3). In other words, motivational investigations try to explain deep empathy about why people do the things they do. Motivation is generally defined as something that explains the direction and magnitude of behavior, or in other words, describes what goals people choose to pursue and how actively or intensively they pursue them. If a person's motivation to achieve a goal is strong enough, there will be little obstacle for that person to persist until the goal is achieved.

## 2. RESEARCH METHOD

The study method used is research and development (R and D) is used to design new products and procedures, then apply research methods for field trials, evaluate and improve products and procedures until they meet the criteria for effectiveness, quality and standardization (Borg & Gall, 2007). The development of this household waste management training model uses the Dick and Carry model in steps 1 to 7, Borg and Gall at the beginning of the development model, and the ARCS model in the seventh step in the Dick & Carey model.

## 2.1 Design of the developed Waste Management Training Model "SPIRIT"

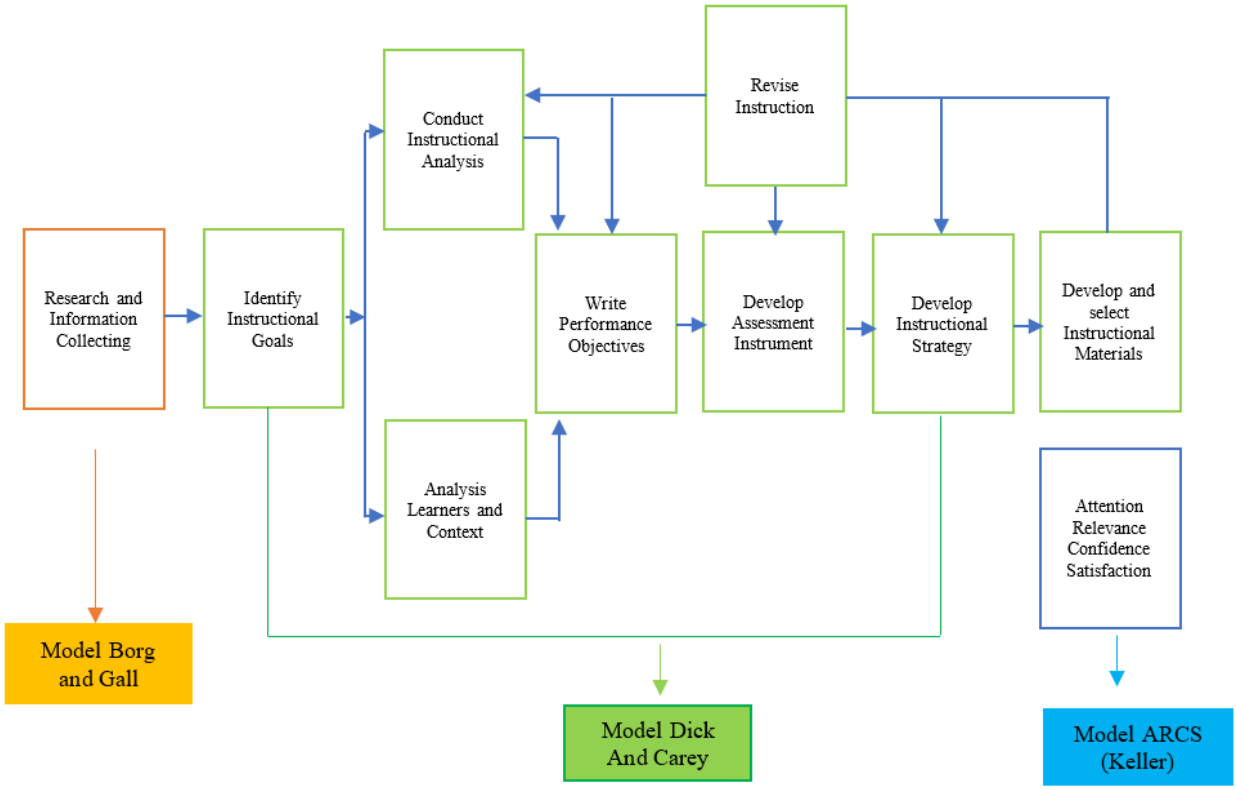


**Figure 1**. SPIRIT Training Model by Yayan Sudrajat

The R&D research that will be carried out follows the steps in Figure 1 only to *Develop and select Instructional Materials* and does not test until summative evaluation. The training model that will be developed is called the "SPIRIT" training model. To create motivation-based learning, the learning materials that will be developed in this research are a conceptual model and physical learning materials for the training model that has been designed from the concepts presented previously.

## 2.2 Characteristics of the SPIRIT Training Model

### *1. Participant of Training*

Participants consisted of prospective trainers who had 61.5% high school education, 23.1% undergraduate education, and 7.7% postgraduate education who were involved in the development of this motivation-based household waste management training model by profession as trainers. is 84.6%, private employees 7.7%, other professions 7.7% and is also a trainer from the Jakarta Compost Academy and a member of the CAMIK Indonesia Center Foundation.

### *2. Training instructors are people who have attended training for prospective trainers at once*

### *3. Products of the developed Training Model*

a. Instructor Handbook
   This instructor handbook will be used by instructors who have attended training.
b. Training Teaching Materials
   Training Teaching Materials in the form of a training course book consist of 3 training courses consisting of training item 1 on household waste management, training course book 2 on segregating household waste, and training item 3 on composting household waste.

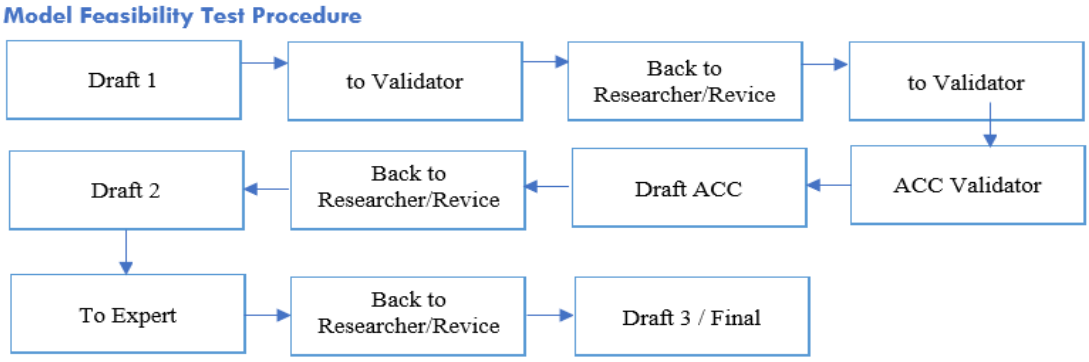


**Figure 2**. Model Feasibility Test Procedure

## 3. RESULTS AND DISCUSSION

### 3.1 SPIRIT Conceptual Model

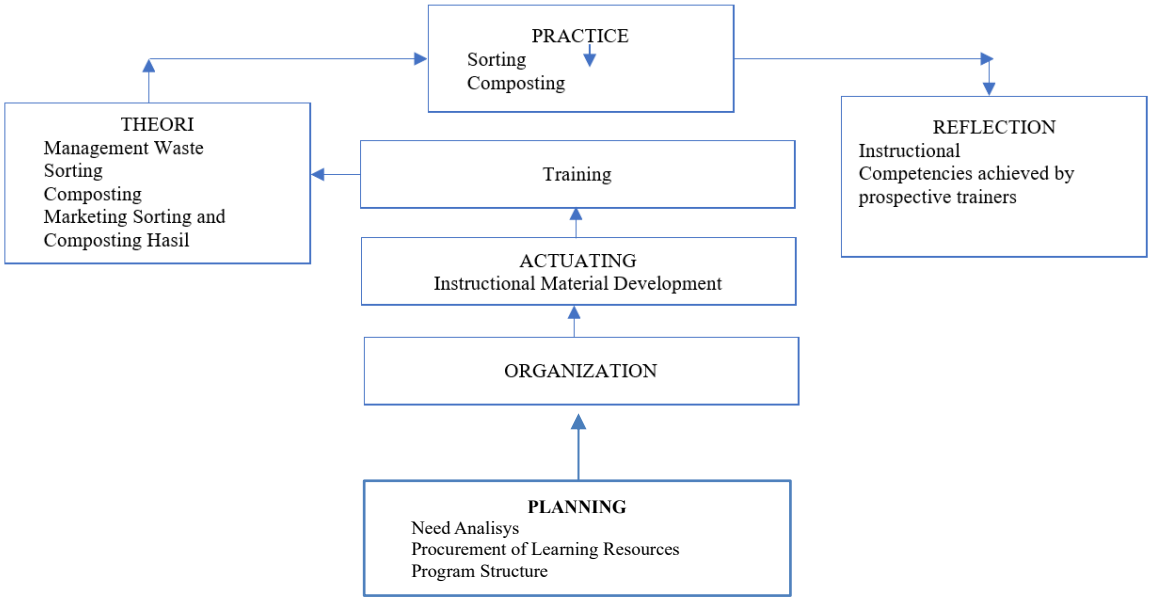


**Figure 3**. SPIRIT Conceptual Model

### 3.2 SPIRIT Procedural Model

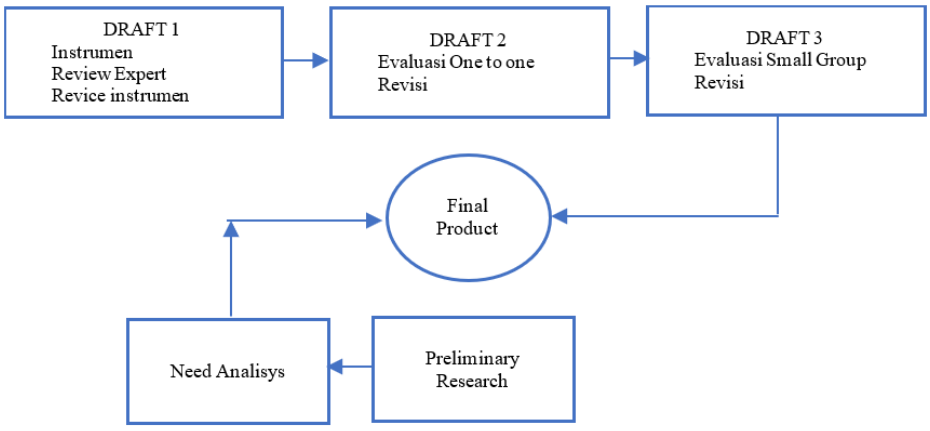


**Figure 4**. SPIRIT Procedural Model

## 3.3 SPIRIT Fisical Model

In addition to conceptual models and procedural models, the researchers also made physical models of household waste management training learning materials, such as:

1. The Instructor Handbook is a training book designed through the SPIRIT development model which will be *broken down* into a program structure, Outline of Training (GBP), training syllabus, with a size of 18.2cm x 25.7cmdoft *covercover* 230 gramart carton,finishing, *full color* both *cover* and content, *book paper* 80 gramand hot glue binding.
   Instructional Goals (TUD)
   a. If the trainer candidate is given questions to describe 3R waste management, recognize the types and characteristics of household waste, and distinguish organic and non-organic waste, then 80% of the truth is
   b. If the prospective trainer is given a question to reiterate the benefits of sorting waste, doing ways to sort waste, and being able to make garbage containers, then 80% of the truth is.
   c. If the trainer candidate is given a question to identify the type of composting waste, identify the types of composter, and carry out the composting stage then 80% of the truth is
   Instructional Objective (TKD)
   a. If given the task of describing 3R waste management, the trainer candidate can answer 80% of the truth.
   b. If given the task of knowing the types and characteristics of household waste, the trainer candidate can answer 80% of the truth.
   c. If given the task of distinguishing organic and non-organic waste, the trainer candidate can answer 80% of the truth.
   d. If given a question to mention the benefits of sorting waste, the trainer candidate can answer 80% of the truth.
   e. If given the task of sorting waste, the trainer candidate can answer 80% of the truth.
   f. If given the task of making a garbage container, the trainer candidate can answer 80% of the truth
   g. If given a question to identify the type of waste composting, the trainer candidate can answer 80% of the truth.
   h. If given a question to identify the types of composters, the trainer candidate can answer 80% of the truth.
   i. If given the task of doing the composting stage, the trainer candidate can answer 80% of the truth
2. Printed in the form of training courses for prospective *trainers* teaching materials, with a teaching material book size of 18.2 cm x 25.7 cm paper, doft *covercover*, 230 gram art cartonfinishing, *full color* both cover and content, *book paper* 80 gramfor contents, and bound hot glue.
3. Modul 1
   The purpose of studying the Education and Training Modul 1
   a. Be able to describe the journey of a pile of garbage
   b. Able to mention the negative impact of waste
   c. Able to mention the types of waste
   d. Able to analyze the concept of 3R
4. Modul 2
   The purpose of studying the Education and Training Modul 2
   a. Be able to mention the benefits of sorting waste
   b. Able to do how to sort waste
   c. Able to make trash containers
5. Modul 3
   The purpose of studying the Education and Training Course 3
   a. Able to identify the type of waste composting
   b. Able to identify types of composter
   c. Able to make Compost containers

## 3.4 Validation of the Feasibility Model

### *Results of the Feasibility Model*

Validation of theExpert validation of motivation-based training materials to determine its feasibility. For instruments, curriculum experts, learning design experts, media experts, and material experts. The researcher used a questionnaire with a Likert scale of 1-5 with the following assessment criteria (Widoyoko, 2017:59):

**Table 1.** Assessment Criteria for Average Score

| Average Score | Education Training |
|---|---|
| > 4,4 | Very Eligible |
| > 4,0 | Eligible |
| > 3,2 | Less Eligible |
| > 2,8 | Not Eligible |
| > 1,6 | Very Poor |

For one test instrument one *(faceto face tryout)* and field trials *(field trials),* researchers used a form of a question with three options: yes, no, and hesitation. The following are the assessment criteria used (Widoyoko, 2017:62). After all the data collected was processed using simple statistics. For the assessment using the average of the total values. The average value

is used as the basis for providing the level of assessment of the learning materials developed. This learning material product is validated and evaluated by experts to see further the shortcomings and weaknesses that need to be followed up on the product developed before being tested on students. The overall expert test results on learning materials for motivation-based training models can be seen in **Table 2.**

**Table 2**. Recapitulation of Expert Test Assessment

| No | Experts | Average | Category |
|---|---|---|---|
| 1 | Instructional Design | 4,89 | Very Appropriate |
| 2 | Curriculum | 4,81 | Very Appropriate |
| 3 | Instructional Material | 4,75 | Very Appropriate |
| 4 | Instructional Media | 4,80 | Very Appropriate |

### *Product Revision Based on Expert Review*

In the following, suggestions from experts will be presented as input for improvement of the training model learning materials. Based on suggestions, namely from learning design experts that substantially the material in this learning material is appropriate and easy to understand. According to learning design experts, motivation-based training teaching materials are appropriate for use in learning, but there are some things that need to be revised. Suggestions from learning design experts are presented in the **Table 3.**

**Table 3**. Suggestions for Improvement from Instructiona Design Experts

| No | Suggestions for | Improvement |
|---|---|---|
| 1 | Improve the training objectives by using Operational Verbs | Improve the training objectives by using Operational Verbs |
| 2 | Add a Glossary | Add a Glossary |

According to curriculum experts, the motivation-based instructor handbook is appropriate for use in training but there are some things that need to be revised. Suggestions from curriculum experts are presented in **Table 4.**

**Table 4**. Suggestions for Improvement from Curriculum Experts

| No | Suggestions for | Improvement |
|---|---|---|
| 1 | Add special training objectives with ABCD elements | Adding the formulation of special training objectives with ABCD elements |
| 2 | Learning methods are replaced with learning strategies | Replacing the word learning methods into learning strategies |

Furthermore, suggestions from material experts will be presented that substantially the material in this learning material is appropriate and easy to understand.

**Table 5**. Suggestions for Improvement from Material Experts

| No | Suggestions for | Improvement |
|---|---|---|
| 1 | Typo error needs to be fixed | Fixing Typo error |
| 2 | Add materials on composting household waste | Add materials on composting household waste |

According to media experts, training materials based on training and instructor handbooks are appropriate for use in learning, but there are some things that need to be revised. Suggestions from media experts are presented in **Table 6.**

**Table 6**. Suggestions for Improvements from Media Experts

| No | Suggestions for | Improvement |
|---|---|---|
| 1 | Book cover design should not be too crowded | Improve the book cover |
| 2 | Don't fill in too many illustrations with books. | Delete illustrations that have 1 function |

In this research and development, three stages of trials were developed, namely:

1. One-to-one trial. This trial was carried out after the revised expert data were tested *one-to-one* to determine the applicability of learning materials, effectiveness and efficiency in the learning process. In each trial conducted, it aims to draw conclusions from the results of test data analysis in explaining the product or learning model developed which is tested as a basis for making decisions whether the resulting learning materials need to be revised or not, decision making to revise learning materials need to be accompanied by learning support that after being revised this model will be better, more effective, efficient and attractive to prospective trainers. This *one-on-one* trial involving students/prospective trainers aims to determine whether the learning materials developed can be applied correctly by students/prospective trainers. These results and trials were revised again so that motivation-based learning materials were ready for small group trials.
2. Small Group Test Test *(Small Group)* try aims to determine whether the learning material has been properly implemented and how effective was the result of the application of the learning material to the achievement of the purposes of research. This small group test was conducted on 9 trainees. The emphasis on small group trials at this stage is still focused on the efficiency and attractiveness of learning materials by using the results of improved drafts

of learning materials. These results and trials were revised again so that motivation-based learning materials were ready for field trials.

3. Field trials *(Field Trials).* This trial aims to determine whether the learning materials have been applied correctly and how effective the results of applying these learning materials to the achievement of research objectives. Field tests were conducted on 13 students. The emphasis of field trials at this stage is still focusing on the efficiency and attractiveness of learning materials by using the results of improved drafts of learning materials.

## 3.5 3.5. The Effectiveness of the Motivation-Based Training Model

The process of conducting the trial is as follows: First, the respondents were introduced to motivation-based learning materials by explaining the steps on how to use the QR Code, the trainees were then given time to read the learning materials. Respondents were also asked to fill out a questionnaire that had been prepared through the bitly and qr code that had been provided. Based on the results of research on the use of the ARCS method in the training model for household waste management, the average number was 4.91 with the highest scale value being 5, so the research results were 98%. Thus, it can be concluded that this motivation-based training model has proven to be effective as a learning resource for prospective trainers.

**Table 7.** Effectiveness Test

| t-Test: Two-Sample Assuming Equal Variances | | |
|---|---|---|
| | Product | Project |
| Mean | 86,62 | 81,69 |
| Variance | 5,09 | 10,73 |
| Observations | 13 | 13 |
| Pooled Variance | 7,91 | |
| Hypothesized Mean Difference | 0 | |
| df | 24 | |
| t Stat | 4,46 | |
| P(T<=t) one-tail | 0,00 | |
| t Critical one-tail | 1,71 | |
| P(T<=t) two-tail | 0,00 | |
| t Critical two-tail | 2,06 | |

The mean is the average value of product assignments 86.62 and the average value of project assignments 81.69. The calculated t value is 4.46 and the t table value is 1.71. From the results of the statistical analysis of the t-test hypothesis test above, we can conclude as follows: t count > t table, then reject H0 (accept H1) or p-value (0.00) < alpha (0.05) then reject H0 (accept H1). From the results of the statistical analysis of the t-test hypothesis test above, the researcher concludes that product assignments are more effective than project assignments.

## 4. CONCLUSION

In conducting research on the development of a training model for household waste management, this was carried out in a development stage, which eventually resulted in 4 printed products, namely a training instructor's handbook and teaching materials for motivation-based household waste management training. For this motivation the researchers brought up activities from the use of the ARCS method, namely *Attention* (attention), *Relevance (*relevance), Confidence (comfort) in attending the training, and *Satisfaction* (satisfaction) after following the training material. After conducting the research, the researcher can conclude as follows:

1. Based on the description that has been described about the research development process, the feasibility of the model, the effectiveness of the model, and the discussion that has been described in chapter IV, it can be concluded that the motivation-based training model for household waste management that has been developed is very good and needs to be maintained as follows:
   a. The procedure for developing a motivation-based household waste management training model is a combination of the Borg and Gall model for preliminary research, the Dick and Carey model for the training system, and the ARCS model for increasing motivation in training. The combination of the 3 models is named the "SPIRIT" training model
   b. Validation or expert testing of this product is carried out by experts in the fields of learning design, curriculum, materials, and media.
   c. Based on the assessment of the learning design expert, he assessed that this training material had met the learning needs of the trainees in terms of objectives, presentation and the material met the complete, consistent, and clear criteria. In general, this training material is considered very good, which means that this product is suitable and suitable for use in training.
2. The experts who validate stated the feasibility of the training model for household waste management as follows:
   a. Curriculum experts considered that this instructor's handbook was systematic and met the learning needs of the trainees seen from the way in which the general objectives of the training were written, the specific objectives of the training, program structure and syllabus met the complete criteria, consistent, and clear. In general, this training material is considered very good, which means that this product is suitable and suitable for use in training.
   b. Based on the assessment of material experts, the material meets the complete, consistent, and clear criteria. In

general, this learning material is considered very good, which means that this product is suitable and suitable for use in learning.

c. Media experts said that the media used in this training material was considered good although it needed some improvement. In general, the media used in this training material is considered good, it can be interpreted that this product is appropriate and feasible to use.

3. The effectiveness of the training model is measured by assigning product assignments and project assignments, so that the results of product assignments are more effective than project assignments. The mean value of product assignments is 86.62 and the average value of project assignments is 81.69. The t-*count* value is 4.46 and the t-table value is 1.71 where if t-*count* > t-*table* then reject H0 (accept H1) or p-value (0.00) < alpha (0.05) then reject H0 (accept H1). The results of the training are seen from the test results in the form of assignments in the form of product assignments and project assignments, both of which show good average scores. For project assignments 81.69 and for the average value of product assignments is 86.6. So, it can be concluded that motivation-based training materials are proven to be effective as learning resources that can improve the learning outcomes of training participants. Based on data from prospective motivational trainer, the percentage of paying attention *(attention),*relvansi *(relevance),* comfortable *(confidence)* andsatisfaction *(satisfaction)* by 98%. So, it can be concluded that the use of motivation can increase the motivation of the trainees.

## AUTHOR'S CONTRIBUTIONS

The authors discussed the results and contributed to from the start to final manuscript.

## CONFLICT OF INTEREST

There are no conflicts of interest declared by the authors.

## REFERENCES

Abur, B. T., Enomena Oguche, E., & Ayuba Duvuna, G. (2014). Characterization of municipal solid waste in the Federal Capital Abuja, Nigeria. *Global Journal of Science Frontier Research:H Environment & Earth Science*, *14*(2), 1–7. https://globaljournals.org/GJSFR_Volume14/1-Characterization-of-Municipal-Solid.pdf

Agwu, M. . (2012). Issues and Challenges of Solid Waste Management Practices in Port-Harcourt City, Nigeria- a behavioural perspective. *American Journal of Social and Management Sciences*, *3*(2), 83–92. https://doi.org/10.5251/ajsms.2012.3.2.83.92

Bakhtiar, A. M., & Nugroho, A. S. (2016). Curriculum development of environmental education based on local wisdom at elementary school. *International Journal of Learning, Teaching and Educational Research*, *3*, 20–28.

Banga, M. (2011). Household Knowledge , Attitudes and Practices in Solid Waste Segregation and Recycling : The Case of Urban Kampala. *Zambia Social Science Journal*, *2*(1), 27–39.

https://pdfs.semanticscholar.org/ff4d/56173c679922dd137096d50a3d5a7932a5d4.pdf

Bartl, A. (2014). Moving from recycling to waste prevention: A review of barriers and enables. *Waste Management and Research*, *32*, 3–18. https://doi.org/10.1177/0734242X14541986

Borg, W. R., Gall, M. D., & Bennett, N. (2007). Educational Research: An Introduction. In *British Journal of Educational Studies* (Vol. 32, Issue 3, p. 445). https://doi.org/10.2307/3121583

BPS. (2017). *Proyeksi Penduduk Indonesia 2010-2035* (pp. 335–358). https://doi.org/10.1055/s-2008-1040325

BPS. (2020). *Jumlah penduduk tahun 2020*. https://doi.org/https://www.bps.go.id/subject/12/kependudukan.html

Branch, R. M. (2009). *Instructional design: the ADDIE approach*. Springer ScienceþBusiness Media. https://doi.org/10.1007/978-0-387-09506-6

Celik, A., Yaman, H., Turan, S., Kara, A., Kara, F., Zhu, B., Qu, X., Tao, Y., Zhu, Z., Dhokia, V., Nassehi, A., Newman, S. T., Zheng, L., Neville, A., Gledhill, A., Johnston, D., Zhang, H., Xu, J. J., Wang, G., … Dutta, D. (2018). What a waste: solid waste management in Asia. *Journal of Materials Processing Technology*, *1*(1), 1–8. http://dx.doi.org/10.1016/j.cirp.2016.06.001%0Ahttp://dx.doi.org/10.1016/j.powtec.2016.12.055%0Ahttps://doi.org/10.1016/j.ijfatigue.2019.02.006%0Ahttps://doi.org/10.1016/j.matlet.2019.04.024%0Ahttps://doi.org/10.1016/j.matlet.2019.127252%0Ahttp://dx.doi.o

Connell, M., & John, H. (2003). *How to identify your organization's training needs*. American Management Association.

Damanhuri, E., & Padmi, T. (2010). *Pengelolaan sampah* (pp. 1–30). Institut Teknologi Bandung. https://doi.org/10.1364/josaa.1.000711

Dermawan, Lahming, Ahsan S, M., & Mandra. (2018). Kajian strategi pengelolaan sampah. *UNM Environmental Journals*, *1*(18), 86–90.

Dick, W., Carey, L., & Carey, J. O. (2015). *The systematic design of instruction* (8th ed.). Pearson.

Hannafin, M. J., & Peck, K. L. (1988). *The design development and evaluation of Instructional Software*.

Harahap, A. J., Erianto, O., Manurung, H., Kurnia, D. H., Hartono, Abdullah, D., Erliana, C. I., Hardianto, D., Kundharu, S., Rianita, D., Setiawan, M. I., Budi, Y. S., Rosida, T. M., S, S., Sinurat, M., Siregar, A., Hutauruk, R. P. S., & Sibaran, N. B. (2003). Sylabus and Matrials Design for Vocational Student and Its Dissemination Using Website. *Vaccine*, *June*, 14–15. https://doi.org/doi :10.1088/1742-6596/1114/1/012023

Harahap, R. D. (2016). Pengaruh Sampah Rumah Tangga Terhadap Pelestarian Lingkungan Ditinjau Dari Aspek Biologi Di Komplek Perumahan Graha Pertiwi Kel. Urung Kompas Kec. Rantau Selatan Effect of Household Waste Viewed From the Aspect Environmental Conservation Biology in Housin. *Cahaya Pendidikan*, *2*(1), 92–104. https://doi.org/10.33373/chypend.v2i1.609

Haryani, D., & Tri, J. R. (2016). Pelatihan pengelolaan sampah rumah tangga dalam memotivasi berwirausaha ibu rumah tangga. *Journal of Nonformal Education*, *2*(2). https://doi.org/https://doi.org/10.15294/jne.v2i2.6787

Hasibuan, R. (2016). Analisis dampak limbah/sampah rumah tangga terhadap lingkungan hidup. *Jurnal Ilmiah "Advokasi," 04*(01), 42–52. https://doi.org/10.36987/jiad

Iriruaga, E. T. (2012). Solid Waste Management in Nigeria. *Waste Management*.

Jalil, M. A. (2010). Sustainable Development in Malaysia: A Case Study on Household Waste Management. *Journal of Sustainable Development*, *3*(3), 91–102. https://doi.org/10.5539/jsd.v3n3p91

Jefrey, Wilhelmina, S. L., Viennie, K., Trisca, V., Afrianty, S., Danat, V., M, V. K., & Christhomas, J. (2019). Penyediaan tempat pembuangan sampah dan edukasi klasifikasi jenis-jenis sampah. *The First National Conference for Community Service Project(1stNaCosPro2019)Empowering Society, Driving Change: Social Innovation*, 255–260.

Keller, J. M. (2010a). *Motivational design for learning and performance*. Springer Science. https://doi.org/10.1007/978-1-4419-1250-3

Keller, J. M. (2010b). *Motivational Design for Learning and Performance*. springer.

Kumar, S., Arya, S., Kumar, R., Smith, S. R., Fowler, G., Cheeseman, C., Velis, C., & Kumar, S. J. (2017). Challenges and opportunities associated with waste management in India. *Royal Society Open Science*, *4*(3). https://doi.org/10.1098/rsos.160764

Kurniadi, D. (2007). *Prinsip-prinsip dasar manajemen pelatihan*. Universitas Pendidikan Indonesia.

Marliani, N. (2015). Pemanfaatan Limbah Rumah Tangga (Sampah Anorganik) Sebagai Bentuk Implementasi dari Pendidikan Lingkungan Hidup. *Formatif: Jurnal Ilmiah Pendidikan MIPA*, *4*(2), 124–132. https://doi.org/10.30998/formatif.v4i2.146

Meidiana, C., & Gamse, T. (2010). Development of waste management practices in Indonesia. *European Journal of Scientific Research*, *40*(2), 199–210.

Miezah, K., Obiri-Danso, K., Kadar, Z., Fei-Baffoe, B., & Mensah, M. Y. (2015). Municipal solid waste characterization and quantification as a measure towards effective waste management in Ghana. *Waste Management*, *46*, 15–27. https://doi.org/10.1016/j.wasman.2015.09.009

Nizar, M., Munir, E., Munawar, E., & Irvan. (2018). Implementation of zero waste concept in waste management of Banda Aceh City. *IOP Conf. Series: Journal of Physics:*, *1116*, 1–12. https://doi.org/10.1088/1742-6596/1116/5/052045

Oghenejoboh, K. M., Babatunde, A. A., & Nwaukwa, C. T. (2007). Effects of air pollution arising from associated gas flaring on the economic life of the people of oil producing communities in Nigeria. *Journal of Industrial Pollution Control*, *23*(1), 1–9.

Perda Bogor. (2012). *Peraturan daerah kota Bogor nomor 9 tahun 2012*.

Ramon, A., & Afriyanto, A. (2017). Karakteristik Penanganan Sampah Rumah Tangga Di Kota Bengkulu. *Jurnal Kesehatan Masyarakat Andalas*, *10*(1), 24. https://doi.org/10.24893/jkma.10.1.24-31.2015

Rizal, M. (2011). Analisis pengelolaan persampahan perkotaan. *Smartek*, *9*(2), 155–172.

Rowntree, D. (1993). Preparing Materials for Open, Distance and Flexible Learning. An action guide for teachers and trainers. In *Open and Distance Learning Series*. Kogan Page.

Sakai, S., Sawell, S. E., Chandler, A. J., Eighmy, T. T., Kosson, D. S., Vehlow, J., Van Der Sloot, H. A., Hartlén, J., & Hjelmar, O. (1996). World trends in municipal solid waste management. *Waste Management*, *16*(5–6), 341–350. https://doi.org/10.1016/S0956-053X(96)00106-7

Santoso, S. B., Margowati, S., Dyah, K., Pujiyanti, U., Prabandaru, Pudyawati, E., & Prihatiningtyas, S. (2021). Pengelolaan sampah anorganik sebagai upaya pemberdayaan nasabah bank sampah. *Community Empowerment*, *6*(1), 18–23.

Shafy, A., & Mansour, S.M., M. (2018). Solid waste issue: Sources, composition, disposal, recycling, and valorization. *Egyptian Journal of Petroleum*, *27*(4), 1275–1290. https://doi.org/10.1016/j.ejpe.2018.07.003

Sharif, A., & Cho, S. (2015). 21st-Century instructional designers: bridging the perceptual gaps between identity, practice, impact and professional development. *RUSC. Universities and Knowledge Society Journal*, *12*(3), 72. https://doi.org/10.7238/rusc.v12i3.2176

Simonson, M., Smaldino, S., Albright, M., & Zvacek, S. (2005). *Teaching and Learning at a Distance (fourth Edition)*. http://learning.fon.edu.mk/knigi/teachinganlearningatadistance-4.pdf

Slamet, J. S. (2002). Prinsip dasar kesehatan lingkungan. In *Kesehatan lingkungan* (Revisi). Gadjah Mada University Press.

Subekti, S. (2009). *Pengelolaan Sampah Rumah Tangga 3R Berbasis Masyarakat*. 124-130Subekti, S. (2009). Pengelolaan Sampah Ruma. https://doi.org/10.1109/GLOCOM.2009.5426153

Sulistiyorini, N. R., Darwis, R. S., & Gutama, A. S. (2015). Partisipasi Masyarakat Dalam Pengelolaan Sampah Di. *Share Social Work*, *5*(1), 71–80.

Suparman, M. A. (2014). *Desain Instruksional Modern:Panduan para pengajar dan inovator pendidikan* (N. I. Sallama (ed.); 4th ed.). Erlangga.

Undang-undang Nomor 18 RI. (2008). *Undang-undang Nomor 18 tahun 2008 tentang pengelolaan sampah* (Vol. 53, Issue 9).

Undang-undang No. 32, 2009. (2009). *Undang-undang Nomor 32 tahun 2009 tentang perlindungan dan pengelolaan lingkungan hidup*.

Undang-Undang Nomor 18, 2008. (2008). *Undang-undang nomor 18*.

Wahyuni, S., Rokhimah, A. N., Mawardah, A., & Maulidya, S. (2019). Pelatihan pengolahan sampah organik skala rumah tangga dengan metode Takakura di Desa Gebung. *Indonesia Journal of Cummunity Empowement*, *1161*(2657–117), 51–54.

*Walter Dick, Lou Carey 2015*. (n.d.).

Widawati, E., HarliantoTanudjaja, Iskandar, I., & Budiono, C. (2014). Kajian potensi pengolahan sampah (studi kasus : kampung Banjarsari ). *Jurnal Metris*, *15*, 119–126. http://ojs.atmajaya.ac.id/index.php/metris/article/view/78

Widiarti, I. W. (2012). Pengelolaan sampah berbasis "zero waste" skala rumah tangga secara mandiri. *Jurnal Sains &Teknologi Lingkungan*, *4*(2), 101–113. https://doi.org/10.20885/jstl.vol4.iss2.art4

Widiyanto, A. F., Suratman, Alifah, N., Murniati, T., & Pratiwi, O. C. (2019). Knowledge and practice in household waste management. *Kesmas*, *13*(3), 112–116. https://doi.org/10.21109/kesmas.v13i3.2705

Wiliandari, Y. (2014). Rancangan pelatihan dan pengembangan sdm yang efektif. *Jurnal Jurusan Pendidikan IPS Ekonomi*, 94–110.

Yustikarini, R., Setyono, P., & Wiryanto. (2017). Evaluasi dan Kajian Penanganan Sampah dalam Mengurangi Beban Tempat Pemrosesan Akhir Sampah di TPA Milangasri Kabupaten Magetan An Evaluation and Study of Trash Treatment in Reducing Loading of Solid Waste Processing Plant at TPA Milangasri , District of. *Proceeding Biology Education Conference*, *14*(1), 177–185. https://jurnal.uns.ac.id/prosbi/article/view/17642