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Abstract: This study examined belief, concern, and practice of the in-service postgraduate science teachers towards solid waste management and recycle (SWMR) in one of the colleges of education in Bhutan. A structured online survey questionnaire was administered to 39 first-year in-service science teachers out of which 22 (13 male and 9 female) responded. The data were subjected to descriptive statistics such as determining mean and standard deviation. Further, Pearson product-moment correlation was employed in order to determine the significance of some of the demographic characteristics on their belief, concern, and practice towards SWMR. An independent samples test revealed that the only statistically significant difference between the gender is observed in theme concern ($p < 0.05 = 0.028$), with females reporting higher levels of concerns than the males. However, one-way ANOVA result did not show any statistically significant presence in the teaching subjects among the three themes ($F_{(3, 18)} = 0.477$, $p > 0.001$). The Pearson's product moment correlation revealed statistically significant relation between respondents' belief and practice ($r = 0.01$, $p > 0.05$), whereas negative correlation ($r = -.37$, $p > 0.05$) were found between respondents' concern and practice towards SWMR.

Keywords: solid waste management, recycle, in-service teachers, belief, concern, practice

1. Introduction

While talking about education and waste management in any sections of the society, the role that every science teacher can play in providing waste related education is pivotal compared to other subject teachers [1]. Education is a tool, that can be used to create societal level awareness on environmental problems through the formal education system [2, 3, 4, 5]. Effective and efficient waste management is an essential part of sustainable development goals, creating awareness on waste issues, can be best done in schools.

Despite, considerable amount of attention environmental issues receives from the world leaders, it's often been a centre of discussion and debate for decades [6]. Therefore, it is imperative to study science teacher's attitudes towards SWMR in terms of belief, concern, and practice.

Bhutan, a tiny kingdom nestled in the Himalayas is not an exception to this man-made predicament and the environmental problems which are caused by humans.

The recent study conducted by Department of Curriculum Research and Developmen [7] of waste besides households, commercial units, health centres, and offices. "In total, institutes generate around 5,400 kgs of wastes a day compared to what industries generate (5,719) kgs daily" (p. XI). The composition of waste generated from institutes is shown in Figure 1. The study further revealed that more than services. In Bhutan, the Department of Curriculum Research and Developmen [7] through their National Waste Inventory Survey had shown that "Waste management is one of the prevailing challenges in governance that have multi-fold implications on environmental, economic and social themes."

2. Literature Review

Problems associated with environment and waste have received immense care globally [8]. Solid waste is defined by Detraz [9] as non-liquid and non-gaseous garbage, refuse or sludge products of human activities, regarded as useless. Solid waste must include waste items from households,

commercial waste, hospital waste, and construction waste. In recent times, numerous studies were undertaken in the field of SWMR by local governments and international agencies (OECD, 2019; UNSD, 2019; World Bank, 2018). A study conducted by Dung et al. [9] concluded that waste management issues will trouble and impact cities beyond repair if adequate measures are not undertaken. Similar studies to estimate environmental awareness and attitudes of people based on their socio-demographic characteristics such as education, gender, income level, and age were undertaken amongst researchers while exploring its relations with the environment. For instance,women were significantly found more concerned with the environmental problem [10]. Environmental concern varies according to education and in come level while age does not seem to have any significance on it.

Equally, over the years, there have been few important studies in the field of education that investigated topics related to solid waste management [1, 3, 4, 8, 10] studied student's attitudes and knowledge towards solid waste management. The findings of these studies had shown similar results that the respondents, who were college students, had shown a positive attitude towards solid wastemanagement with a low level of knowledge.

However, previous studies have neglected variables such as teaching subjects and their influence in determining their belief, concern, and practice of teachers toward SWMR. Therefore, this study which is the first of its kind in Bhutan with the in-service postgraduate teachers, thus attempts to fill the literature gap left by previous studies.

Figure 1
Network teaching quality evaluation system based on big data
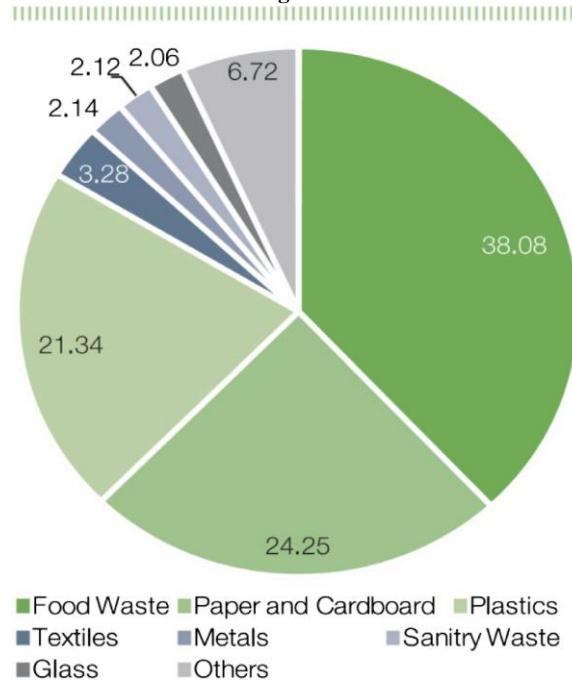
2.1. Theoretical framework

Human behavior is complex. The relationship between behavior and attitude has been a topic of interest within the field of human psychology [11] Since then many theories within this subject evolved in order to understand and predict attitudinal influences on behavior and response. The most widely used theory in environmental behavior researches is the Theory of Reasoned Action [TRA] and its extension, Theory of Planned Behavior [TPB] postulated and popularized by Holbrook [12]. The theory is based on a premise that individual behavior and intentions are directly related to their attitudes. Interestingly, many studies on knowledge and attitudes have found to have a positive and often statistically significant relationship between the behavior and intentions. TPB framework can thus provide guidance to design inter mediation strategies to support maintain positive behavior or bring in changes [2]. The TPB has been widely used to predict a person's intentions to participate in a specific behavior related to environmental behavioral research [11]. Hage and Soderholm [11] mentions about three conceptually independent determinants of intention in the TPB. They are attitudes towards the behavior, subjective norm, and perceived behavioral control. However, these three independent elements intention in TPB varies depending on contexts and behavior. Figure 2 shows the TPB model as conceived by Chanda [6].

Figure 2
Theory of planned behavior
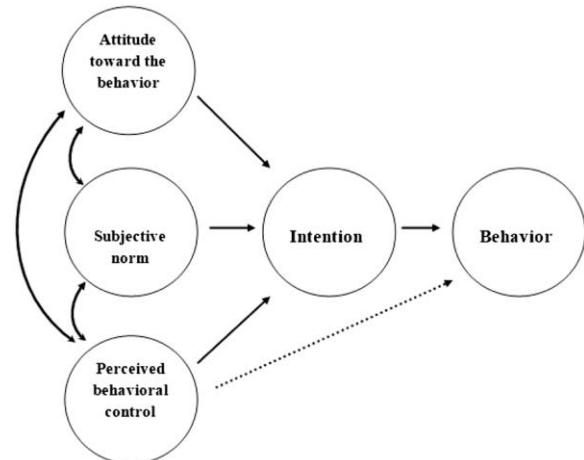
3. Research Methodology

3.1. Research design

This study has employed a cross-sectional study design in order to examine the in-service postgraduate science teachers' belief, concern, and practice towards SWMR. Salkind (2010) and Sedgwick (2014) are of the view that the cross-sectional studies which often uses questionnaire surveys as comparatively inexpensive and quick to conduct at one point in time.

3.2. Participants

A random sampling method was employed for the study. The sample for the study consisted of 22 first year in-service postgraduate science teachers from one of the Colleges of Education in Bhutan. 13 male (59%) teachers and 9 female (40.9%) teachers participated in the study. The sample comprised of 7 biology teachers (31.8%), 10 chemistry teachers (45.5%), and 5 Physics teachers (22.7%). Since the participation for this study was purely on a voluntary basis, only 22 out of 39 in-service postgraduate science teachers took part in the study. The overall response rate was recorded at 56%.

3.2.1. Instruments

In-service first year postgraduate science teacher's attitude towards SWMR were adapted from the Scale for the Attitudes of Pre-service Teachers towards Solid Wastes and Recycle developed by Karatekin (2013). The scale consists of 30 questions and 3 themes. The theme belief consists of 7 items, the theme concern consists of 10 items, and the theme practice has 13 items. The instrument was self-reported with structured five-point Likert scale ranging from Strongly Disagree, Disagree, Neutral, Agree to
Strongly Agree. The values assigned to the options were 1, 2, 3, 4, and 5 respectively. The Cronbach's Alpha for instrument reliability was recorded at 0.87 for the 30 items questionnaire.

Table 1
Interpretation of the mean scale for belief, concern, and practice

Scale	Mean Interpretation	Level
1.00–2.49	Strongly Disagree, Disagree	Low
2.50–3.49	Neutral	Medium
3.50–5.00	Agree, Strongly Agree	High

Table 2
One-way ANOVA results based on teaching subjects

Scale	Frequency	Percentage
Strongly Disagree	7	23.3
Disagree	11	36.7
Not Sure	10	33.3
Agree		0
Strongly Agree	2	6.7

*p < 0.05.

4. Conclusion

To sum up, there is a great relationship between Western rhetoric and English writing, rhetoric is not only the use of rhetoric. However, the use of figures of speech can provide some very useful writing skills for English writing. Rhetoric, as a whole, is an art of persuasion. In the process of using various rhetorical devices to write, English writers should pay attention to strengthening their understanding of rhetoric itself and the knowledge covered within it, and combine the rhetorical perspective to improve their ability to use rhetorical devices such as contrastive, exaggeration and so on.

Recommendations

The finding revealed that the lack of training for both teachers and students was the main factor that prevented them from using educational technology tools in teaching and learning Ecology. Therefore, training on educational technology for both teachers and students is recommended. Since educational technology tools have arisen excitement and curiosity amongst students, they recommended other module tutors to use educational technology tools as well. Educational technology tools integrated in the module will be further replicated by student's teacher during teaching practice or as a full fledge teacher. Therefore, tutors were recommended to use variety of educational technology tools in learning, teaching and an assessment.

Acknowledgement

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Ethical Statement

This study does not contain any studies with human or animal subjects performed by any of the authors.

Conflicts of Interest

The authors declare that they have no conflicts of interest to this work.

Data Availability Statement

The data that support the findings of this study are openly available in [repository name e.g "figshare"] at http://doi.org/[doi].

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