Bridging Screens and Green: Fostering Philippine Flora and Fauna Conservation through iNaturalist Citizen Science Application

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ABSTRACT

Biodiversity is continually declining and is changing due to various factors, one of which is human activities which pose a threat to essential ecosystem services. This study investigated the effectiveness of the iNaturalist citizen science application in fostering students' knowledge of Philippine flora and fauna and their conservation practices. A quasi-experimental pretest–posttest control group design was employed among sixty (60) second-year BS – Psychology students in a private Catholic higher education institution in Davao City, with thirty (30) students assigned to the experimental group and thirty (30) to the control group through purposive sampling. Researcher-developed pretest and posttest instruments consisting of 100 true-or-false items measured students' knowledge before and after a three-week intervention. The experimental group used the iNaturalist application to document and identify species in disturbed and undisturbed places, then they developed conservation plans, while the control group used traditional classroom approach only. Pretest results showed a moderately high baseline knowledge in both groups while posttest scores increased to a very high level after the intervention. Furthermore, Paired Samples T-test results indicated a significant within-group pretest and posttest differences similar with the between-group analysis using Independent Samples T-test which also revealed a significant difference after the intervention. Therefore, within-group and between-group analysis reveal that iNaturalist significantly improved students' knowledge of Philippine flora and fauna and their conservation practices. Overall, this study offers useful insights for educators, schools, curriculum developers, students, and researchers as they explore the impacts of using iNaturalist to improve biodiversity knowledge and conservation practices.

Keywords: iNaturalist citizen science application, Philippine flora and fauna, conservation practices, quasi-experimental design, pretest and posttest, Philippines

INTRODUCTION

Biodiversity in the Philippines continues to decline at unprecedented rates due to human-driven environmental changes and population pressures, jeopardizing many species (Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services, 2019). The Philippines, made up of over 7,000 islands, is exceptionally rich in unique species such as bats, but has an insufficient understanding and action regarding their conservation. Despite government interventions, substantial challenges remain. This underscores the urgent need for innovative approaches that effectively engage communities, such as technology-driven citizen science, to support conservation efforts.

Two-thirds of the earth's biodiversity and between 70 percent and 80 percent of its flora and fauna species are found in the Philippines, one of the 18 mega-biodiverse nations. The Philippines is home to 5% of the world's flora and ranks fifth in terms of plant species. The nation is fourth in rank in terms of the endemism of birds, while species endemism is quite high, encompassing at least 25 plant genera and 49% of terrestrial fauna (Ani & Castillo, 2020). Biodiversity is a reliable indication of ecosystem health; therefore, achieving sustainable development requires its conservation. However, the supply of ecosystem services is impacted by anthropogenic climate change, which poses widespread and increasing challenges to biodiversity. Because species and ecosystems may react differently to climate change, these risks further complicate and increase the unpredictability of conservation projects. Due to a lack of conservation resources, more terrestrial plant and animal species are in danger of extinction. How to effectively distribute scarce resources among several target species and/or habitats that require urgent conservation attention is one of the issues facing biodiversity conservation (Hernandez et al., 2022).

Asia's richness and rates of habitat destruction make it a global priority for immediate conservation action. Over half of the world's population lives in the area, which also contributes over 40% of carbon emissions and is home to several of the planet's most environmentally vulnerable and biodiverse nations. Even so, only around 9% of the land area in Asia is protected, despite the fact that the region is home to 10 of the top 35 biodiversity hotspots in the world. It has one of the greatest rates of deforestation in the world and is a hotspot for threats to numerous species (Zhu et al., 2021). Demand for more evidence-based conservation is rising, with data guiding choices and assessing effectiveness. As the world commits to post-2020 biodiversity commitments, this will become even more crucial. Businesses aiming for sustainability, in addition to governments and civil society organizations, also have difficulty locating appropriate data sets and indicators. Effective, evidence-based conservation of biodiversity and management of natural resources requires data on the state of species and habitats, the threats and pressures they face, and the actions and policies implemented to address them (Stephenson & Stengel, 2020).

In the fields of ecology, conservation, and biodiversity monitoring, citizen science projects and the data they generate are becoming more widespread. Despite previous doubts about the quality of citizen science data, biases may be identified and fixed, making the data's quality equivalent to that of professionally gathered data. As a result, professional science and citizen science are becoming more and more linked, enabling data collection at previously unheard-of geographical and temporal dimensions. Participating in scientific activities through Citizen Science (CS) has been proposed as a way to increase public access to science, improve the informal science education of volunteers, equip individuals with useful skills for society, and add a variety of viewpoints to a more robust science (Aristeidou et. al., 2021). iNaturalist (www.inaturalist.org), a multi-taxa platform and shared initiative of the California Academy of Sciences and the National Geographic Society, is one of the most successful platforms in the world. It enables users to submit observations of any organism, or traces thereof, along with related spatiotemporal metadata. The iNaturalist community then identifies and verifies the observations to high taxonomic resolution, in tandem with the rapidly advancing computer vision recommendations (Callaghan et al., 2022).

By acting as a citizen science platform where researchers and locals record species sightings, iNaturalist contributes to the conservation of Philippine flora and animals and generates useful biodiversity data. These data support community-based protection initiatives, conservation strategies, and the identification of species ranges and vulnerable populations. Encouraging people to document and learn about biodiversity, it raises their knowledge of ecological relationships and promotes biodiversity conservation. iNaturalist produces data that help study across several fields (e.g., education, machine learning, conservation, taxonomy, and ecology), geographical locations, and taxonomic groupings, as demonstrated by Mason et al. (2025). The substantial contribution iNaturalist is making to biodiversity study is demonstrated by the literature assessment of iNaturalist, which found representation in 638 taxonomic families and 128 countries. By democratizing data collecting, iNaturalist is creating new avenues for research that were previously constrained by gaps in taxonomic or geographic data.

The study results of Herodotou et al. (2023) showed that iNaturalist promoted science learning, including the growth of scientific competence and comprehension, and allowed young people to participate, especially those with no background in science. In order to facilitate the creation of hybrid, informative, and inclusive CCS programs for youth, a blended learning framework for biodiversity monitoring in CCS is offered. There is a continuous formal assessment of how well iNaturalist teaches students about biodiversity and its significance. Students have generally reported satisfaction with the iNaturalist projects that have been used. Many students are eager to share what they have seen this semester, share their discoveries, or inquire about a class excursion (Niemiller et al., 2021).

Additionally, for students studying terrestrial creatures, this iNaturalist program performed best when the photographs were of high enough quality. However, iNaturalist identifications varied from 92.3% to 97.3% accurate biological taxonomy classifications to conventional organismal levels for an introductory biology course when just medium-high to high-quality photographs were utilized. All things considered, iNaturalist piqued students' interest by offering higher taxonomic resolution with accurate scientific and common names as well as more natural history details for numerous creatures. Student interest in the biological sciences and the detection of local biodiversity may both rise with the use of this smartphone technology (Unger, 2021).

The foundation of this study is the Theory of Planned Behavior by Icek Ajzen (1991), which explains that the behavior of humans is driven by intention, which is influenced by three key factors: the attitude toward the behavior, subjective norms, and perceived behavioral control. Stronger intentions increase the likelihood of performing a behavior, while perceived control can also directly affect behavioral outcomes. In the context of conservation, this theory helps explain how individuals develop pro-environmental actions. Applied to the use of iNaturalist, it suggests that increased awareness, positive attitudes toward biodiversity, social influence, and a sense of capability can help strengthen students' intentions to engage in conservation initiatives. As a result, the application indirectly promotes the Philippine flora and fauna conservation by encouraging informed, motivated, and action-oriented behaviors among students.

Similarly, the Experiential Learning Theory by David Kolb (1984) explains that there is learning through a continuous cycle of experience, reflection, conceptualization, and application. In this study, the iNaturalist supports this theory by providing students with hands-on experiences in observing and documenting Philippine flora and fauna, which leads to a deeper understanding and improved conservation practices. In addition, this study strongly supports the Social Cognitive Theory by Albert Bandura (1986), which states that learning occurs through observation, cognitive processes, and environmental interaction, where behavior is influenced by modeling and self-efficacy (Nabavi & Bijandi, 2012). In this study, the iNaturalist application influences students' biodiversity knowledge and conservation practices by exposing them to models of environmental behavior, which they observe and imitate. This shows that digital platforms can effectively advance learning and behavior by enhancing motivation, interaction, and confidence in applying conservation practices.

Lastly, the Citizen Science Framework by King et al. (2016) is also supported by this study, which highlights a participatory, technology-driven approach where individuals actively collect and analyze environmental data to promote awareness and action. In this study, the iNaturalist serves as a platform that transforms students into active contributors to biodiversity monitoring, enhancing their knowledge, attitudes, and conservation initiatives. The framework emphasizes that technology-mediated participation fosters meaningful learning and engagement, which can significantly improve students' environmental stewardship and conservation practices.

This study aims to investigate the effectiveness of utilizing the iNaturalist citizen science application in fostering students' knowledge of Philippine flora and fauna and their conservation practices. Specifically, this study seeks to evaluate the students' level of knowledge of Philippine flora and fauna and conservation practices prior to using the iNaturalist citizen science application, evaluate the students' level of knowledge of Philippine flora and fauna and conservation practices after using the iNaturalist citizen science application, examine the significant effect of the iNaturalist citizen science application on fostering college students' knowledge of Philippine flora and fauna and their conservation practices within the experimental group, examine the significant effect of the iNaturalist citizen science application on fostering college students' knowledge of Philippine flora and fauna and their conservation practices between the experimental and control groups, and formulate an action plan for integrating iNaturalist Citizen Science application in classroom activities.

Through the contextual use of the iNaturalist Citizen Science application in the Philippines, a global biodiversity hotspot that remains underrepresented in international research, this study contributes to the literature on citizen science, biodiversity monitoring, and environmental education by providing empirical evidence on how digital platforms like the iNaturalist citizen science application foster biodiversity knowledge and conservation attitudes. Beyond advancing knowledge in the academe, it carries strong social value by equipping Filipino students, educators, and local communities with tools to actively document and safeguard

Philippine flora and fauna, which in turn improves environmental literacy, strengthens conservation efforts, and supports the Sustainable Development Goals.

Furthermore, educators, school administrators, schools, curriculum developers, students, and future researchers will directly benefit from the findings, as the study highlights iNaturalist's potential for learning integration, biodiversity monitoring, and sustainable biodiversity promotion and conservation. Moreover, the study empowers students to take part in environmental stewardship and provides future researchers with a valuable foundation of empirical data and theoretical insights to further explore citizen science and conservation strategies in the Philippine context.

METHODS

Research Design

This research study employed a Quasi-Experimental Research design characterized by the independent variable manipulation, but without randomly assigning participants to groups or to the sequence of conditions. Specifically, this study used a Pretest and Posttest control group design to contrast an experimental group exposed to iNaturalist and a control group using traditional methods through assessments. This approach was employed to assess participants' knowledge regarding an event, or to measure their confidence and ability in applying newly presented information or concepts (studies on acceptance and effectiveness). This design was applied because the study focuses on second-year college students within their authentic classroom setting, where complete experimental control is not feasible. It is considered suitable as it enables the assessment of the effects of the treatment (such as the use of iNaturalist) while preserving ecological validity in real educational contexts.

Research Respondents

The research respondents were the second-year BS-Psychology students who were officially enrolled in the second semester of the S.Y. 2025 – 2026 in one of the private catholic schools in Davao City, 17 years of age and above, possessed basic familiarity in using mobile phones and mobile applications, and took the Science, Technology, and Society and Environmental Science courses. In addition, the said college students were chosen as respondents because they are more focused on understanding human behavior, attitudes, perception, and motivation, which are important variables in this study. The respondents should be in intact class sections designated as the control and experimental groups, which met the inclusion requirements, were part of the study, where they supplied their informed consent and were present during the implementation of the data gathering of the study. The experimental group is composed of thirty (30) students, and the control group consists of thirty (30) students. In quasi-experimental designs, methodological literature frequently recommends a minimum sample size of 30 participants per group as a practical benchmark for identifying medium effect sizes with sufficient statistical power. This guideline is commonly employed in preliminary and exploratory studies to enhance the stability and reliability of inferential statistical tests (Cohen, 1992; Bujang et al., 2017; van Belle, 2011, as cited in Wibowo et al., 2024).

Research Instrument

The study evaluated variables using researcher-developed pretests and posttests. These tests underwent content validation by the research adviser, who is also a subject-matter expert, and items were revised based on recommendations. The test consists of 100 true-or-false items, scored dichotomously (1 for correct, 0 for incorrect). It evaluates students' knowledge of Philippine Flora and Fauna and conservation practices among experimental and control groups before and after intervention. Before actual data collection, the researcher conducted pilot testing on thirty second-year students not included in the main study but enrolled in the same semester at the same school. The analysis yielded a Cronbach's alpha of 0.78, reflecting acceptable internal consistency. This finding indicates adequate item consistency and confirms the instrument's suitability for data collection in this study.

Data Gathering Procedure

Prior to data gathering, the researchers secured approval from the Ethics Review Committee and obtained permission from the dean. Data were collected before and after a three-week period through a face-to-face administration of a pretest and a posttest, as well as the intervention. Prior to the intervention, a 100-item true-or-false pretest (dichotomously scored) was administered to assess baseline knowledge of Philippine flora, fauna, and conservation practices of students. The experimental group received the intervention through the iNaturalist application, where students documented and identified species, classified them (e.g., endemic or invasive), and developed conservation plans, while the control group engaged in traditional methods such as discussions, posters, and concept mapping. After three weeks of intervention, the same 100-item posttest was administered to both experimental and control groups to measure changes in knowledge. The researcher offered support and debriefing, and respondents were given the opportunity to ask questions or clarify things during data gathering.

Data Analysis Procedure

The researcher tabulated the data, which were subsequently analyzed and interpreted by a statistician from the University of Mindanao Professional Schools (UMPS) in accordance with approved statistical procedures, and the results were further discussed by the researcher. Data were analyzed using descriptive statistics and inferential tests such as paired samples T-test and Independent Samples T-test to evaluate iNaturalist's effectiveness in fostering students' knowledge on biodiversity and its conservation practices. The assumption of normality for the pretest and posttest scores was tested using the Shapiro-Wilk Normality Test. Levene's test confirmed that there is a Homogeneity of variances and there is a violation of normality as indicated by the significant normality test. In addition, validated instruments ensured systematic measurement of variables.

RESULTS AND DISCUSSIONS

Students' Level of Knowledge of Philippine Flora and Fauna and Conservation Practices Prior to Using the iNaturalist Citizen Science Application

Table 1 shows the mean of the pretest scores of the control and experimental groups about their knowledge of the Philippine flora and fauna, as well as their conservation practices before the intervention. Shown in the table is that the control group yielded a mean score of 72.20, which is "Moderately high" with an SD of 8.14, while the experimental group recorded a slightly higher mean score of 73.50, which is also "Moderately high" with a standard deviation of 9.55. The minute difference between the recorded mean score of the two groups indicates that they had the same level of knowledge and conservation practices prior to the intervention, which shows baseline equivalence.

Table 1. Pretest mean scores of the control and experimental groups

Group	Mean	Sd	Interpretation
Control	72.20	8.14	*Moderately high*
Experimental	73.50	9.55	*Moderately high*

The pretest results strongly indicate that before the intervention and utilization of the iNaturalist citizen science application, both the control and experimental groups demonstrate a comparable "Moderately high" level of knowledge of the Philippine flora and fauna as well as their conservation practices which are in aligned with the results of the investigation of Delector (2023), Coracero et al. (2022),and Khairani et al. (2019) which states that students often possess strong foundation of knowledge of biodiversity. The findings are also consistent with previous studies of Talens (2024), Oliveira et al. (2025), and Rammou et al. (2023), indicating that baseline cognitive knowledge of biodiversity is provided by formal education but often falls short in engaging students on a deeper level of understanding, making them active stewards of the environment.

Furthermore, the results agree with the existing literature by Picanço et al. (2020), revealing that biodiversity knowledge is the same across students because of limited experiential exposure and a lack of integration of field-based learning in the curriculum.

The results are aligned with the theoretical claims that advocate for an experiential kind of teaching and learning approaches. The observed level of knowledge of both the control and experimental groups aligns with the Theory of Planned Behavior by Icek Ajzen (1991), which theorizes that the increase in students' awareness, as well as their perceived behavioral control, further strengthens their intention to act and conserve biodiversity. Similarly, the findings are consistent with the Experiential Learning Theory by David Kolb (1984), as firsthand students' engagement with the Philippine flora and fauna reflects learning through experience and application. The findings show that both groups have a comparable level of Philippine biodiversity knowledge and their conservation initiatives, which might be caused by their prior knowledge acquired through formal education and their firsthand exposure to the environment.

Students' Level of Knowledge of Philippine Flora and Fauna and Conservation Practices After Using the iNaturalist Citizen Science Application

Table 2 presents the mean of the posttest scores of the control and experimental groups about their knowledge of the Philippine flora and fauna, as well as their conservation practices after the intervention. Shown in the table is that the control group yielded a mean score of 82.10, which is "Very high" with a standard deviation of 5.62, whereas the experimental group recorded a higher mean score of 85.30, which is "Very high" with a standard deviation of 5.32. Also revealed in the table is that the control group has a noticeable improvement in mean score, while the experimental group has a significant increase.

Table 2. Posttest mean scores of the control and experimental groups

Group	Mean	SD	Interpretation
Control	82.10	5.62	*Very high*
Experimental	85.30	5.32	*Very high*

The result of the posttest revealed that the experimental group obtained a higher score compared to the control group, indicating improved knowledge of the Philippine biodiversity after the iNaturalist citizen science application utilization. In addition, the lower standard deviation observed in the experimental group suggests a more consistent learning outcome among students within the group, which implies that the application makes a contribution to the increased knowledge of biodiversity and conservation initiatives. The findings are aligned with the studies of Callaghan et al. (2022), Herodotou et al. (2023), and Echeverria et al. (2021), which reveal that iNaturalist fosters student engagement, encourages conservation practices, and improves scientific literacy.

Moreover, the outcome of this study is in consonance with the Theory of Planned Behavior by Icek Ajzen (1991), which provides an explanation that the increase in exposure to Philippine flora and fauna through the iNaturalist citizen science application increased and improved their attitudes, perceived behavioral control, and social norms regarding biodiversity conservation, which in turn strengthened the students' intention to engage in pro-environmental initiatives. Similarly, the findings agree with the Experiential Learning Theory by David Kolb (1984), which posits that active and hands-on experiences improve and deepen understanding and foster knowledge among students. In addition, the study is consistent with the Social Cognitive Theory by Albert Bandura (1986), suggesting that observing the environment through iNaturalist enhances students' learning and self-efficacy, which can be observed through the improved students' knowledge of Philippine flora and fauna and their conservation practices. Lastly, the results are aligned with the Citizen Science Framework (King et al., 2016), which highlights the idea that students who act as data collectors firsthand become more aware of the biodiversity and more motivated to participate in conservation practices.

Significant Effect of the iNaturalist Citizen Science Application on Fostering College Students' Knowledge of Philippine Flora and Fauna and their Conservation Practices Within the Experimental Group

Table 3 presents the inferential results comparing the college students' knowledge of Philippine flora and fauna and their conservation practices within each group, comparing the mean scores of pretests and posttests. It was revealed that the experimental group demonstrates an increase in mean scores from 73.50 to 85.30 with changes in their standard deviation from 9.55 to 5.32 with a t-value of -7.49 and a p-value of <.001. On the other hand, the control group's mean scores also indicate changes from their mean scores from 72.20 to 82.10 with a change in their standard deviation from 8.14 to 5.62 with a t-value of -5.84 and a p-value of <.001. The p-value of both the control and experimental groups is below the .05 significance level, showing that the observed changes between the pretest and posttest scores within each group were statistically significant. The mean difference of the experimental group before and after the intervention is -11.8, while the mean difference of the control group is -9.87. Prior to the paired t-test statistical analysis, the normality of the data was evaluated through the Shapiro-Wilk test. The pretest scores recorded a W-value of 0.971 with a p-value of .579, while the posttest scores yielded a W-value of 0.965 and a p-value of .422. The p-values are both greater than .05 which indicates that the assumption of normality was met.

Table 3. Significant difference in the college students' knowledge of Philippine flora and fauna and their conservation practices before and after the intervention

Group	Before		After		t-value	p-value	Mean difference
	Mean	SD	Mean	SD			
Experimental Group	73.50	9.55	85.30	5.32	-7.49	<.001	-11.8
Control Group	72.20	8.14	82.10	5.62	-5.84	<.001	-9.87

The results above align with the studies of Coracero et al. (2022), Khairani et al. (2019), and Oliveira et al. (2025), revealing that students often have a relatively strong baseline knowledge of the Philippine flora and fauna as well as their conservation practices. Additionally, after the intervention (iNaturalist) was administered, there was a significant gain in the students' knowledge of Philippine Flora and Fauna conservation and their conservation practices. This is consistent with Herodotou et al. (2023), which reveals that when students used iNaturalist, it promoted science learning, competence, and comprehension in science and the environment.

Therefore, the findings show a statistically significant difference within each group, and agree with the Theory of Planned Behavior, Experiential Learning Theory, Social Cognitive Theory, and the Citizen Science framework because there are observable changes and improvement in their mean scores when compared within each group. The knowledge they have gained through their exposure and direct experience with the environment through the utilization of the iNaturalist citizen science application develops their stronger intention to promote biodiversity conservation efforts. Lastly, the measurable gain within each group is observed because the intervention was given enough time for implementation, and the quality of observations and repeated exposure to the environment were also emphasized.

Significant Effect of the iNaturalist Citizen Science Application on Fostering College Students' Knowledge of Philippine Flora and Fauna and their Conservation Practices Between the Experimental and Control Groups

Table 4 shows the comparison of college students' knowledge of Philippine flora and fauna and their conservation practices between the experimental and control groups before and after the intervention. Prior to using the iNaturalist citizen science application, the experimental group had a mean score of 73.50 and a standard deviation of 9.55, and the control group had a mean of 72.20 with a standard deviation of 8.14, with a t value of -0.553 and a p-value of .582, indicating no statistically significant difference, which strongly confirms the baseline equivalence. After the intervention, the experimental group's mean had an observable increase to 85.30 with a standard deviation of 5.32, while the control group had a mean of 82.10 with a standard deviation of 5.2. The t value is -2.289 with a p-value of .026, which is less than the .05 significance level, indicating a statistically significant difference among mean scores. Lastly, the mean difference of the experimental and control groups' scores before the intervention is -1.30, while after the intervention, it becomes -3.233.

Table 4. Significant difference in the college students' knowledge of Philippine flora and fauna and their conservation practices between control and experimental groups

Group	Experimental		Control		**Student's t**	p-value	Mean difference	Effect Size
	Mean	SD	Mean	SD				
Before	73.50	9.55	72.20	8.14	-0.553	.582	-1.30	-0.143
After	85.30	5.32	82.10	5.62	-2.289	.026	-3.233	-0.591

The posttest scores show that the students who belong to the experimental group utilizing the iNaturalist citizen science application notably surpass the control group, indicating the effectiveness of the intervention, which applied the interactive and hands-on learning in fostering the students' knowledge of Philippine flora and fauna, as well as their conservation initiatives. The findings are aligned with the Theory of Planned Behavior by Ajzen (1991), which posits that the intention to act as stewards of the environment, particularly conserving biodiversity, is influenced by the students' awareness, attitudes, perceived behavioral control, and social norms through iNaturalist. Moreover, the Experiential Learning Theory by Kolb (1984), which highlights that through firsthand experience in documenting and observing flora and fauna, students' knowledge is improved, is in consonance with this study. Similarly, the idea of the Social Cognitive Theory by Bandura (1986), which states that students have improved knowledge through observation, direct interaction with the environment, and personal reflection, is aligned with this research. Lastly, the Citizen Science Framework (King et al., 2016) is consistent with the results, which emphasize that participatory, technology-driven data collection can foster students' knowledge of Philippine flora and fauna and their conservation practices.

Furthermore, the findings are aligned with the previous studies of Callaghan et al. (2022), Herodotou et al. (2023), Echeverria et al. (2021), and Unger (2021), which reveal that iNaturalist strongly promotes scientific competence, facilitates participation among students with little to no knowledge, and increases awareness of biodiversity. Similarly, the results are in consonance with the prior research studies of Stephenson & Stengel (2020) and López-Guillén et al. (2024) that active participation in documenting local biodiversity fosters meaningful engagement with the environment and knowledge retention and improvement, which bridges the gap between behavior and awareness. Therefore, when results were compared between groups, the experimental group outperformed the control group, which confirms that the technology-driven citizen science approach is more effective in fostering knowledge of Philippine flora and fauna and their conservation initiatives compared to the traditional approach in teaching and learning.

Action Plan for Integrating iNaturalist Citizen Science Application in Classroom Activities

With the findings that revealed that the iNaturalist Citizen Science application pronouncedly improved and advanced the students' knowledge of the Philippine flora and fauna, as well as their conservation practices, the researcher of this study proposed an action plan in which educational institutions should integrate the iNaturalist application into the classroom discussions, particularly science and environmental education-related courses. The students will be involved in iNaturalist-based activities in which they are going to document different species, map biodiversity, conduct field observations, and plan projects for conservation within their school, local community, and species' natural areas. Furthermore, educators will be trained to handle and facilitate technology-based exploratory and experiential learning, specifically using the iNaturalist, and partnerships will be organized between the educational institutions and environmental and conservation organizations to provide firsthand and authentic learning experiences.

Through the regular implementation of iNaturalist-based activities, learners will be able to develop a stronger sense of environmental awareness, scientific literacy, and stewardship toward the Philippine biodiversity. This proposal aims to promote sustainable biodiversity conservation practices, strengthen environmental education outcomes, and contribute to biodiversity monitoring initiatives that are consistently aligned with Sustainable Development Goal 4, which is Quality Education, and Sustainable Development Goal 15, which is Life on Land.

CONCLUSION

This study reveals that the college students in both the control and experimental groups possess a moderately high level of knowledge of Philippine flora and fauna as well as their conservation practices before the intervention, which highlights a comparable baseline knowledge and reflects that students do have a strong foundational knowledge of biodiversity, which might be caused by the formal instruction, but still lack a deeper understanding and conservation actions. After the intervention, the experimental group who received the intervention exemplified a more pronounced improvement in their mean score, with a performance with reduced variability compared to the control group. These results show that the iNaturalist citizen science application is an effective digital tool in fostering students’ knowledge of Philippine flora and fauna, as well as their conservation practices.

Furthermore, the inferential analysis revealed that the paired samples t-test shows a statistically significant difference when pretest and posttest results were compared within each group, a result which can be explained by the effectiveness of the iNaturalist citizen science application in fostering students’ knowledge, particularly respondents under the experimental group. In addition, when the overall result of the control group is compared to the overall result of the experimental group, it was revealed that the latter demonstrates a superior improvement. These findings suggest that both the within-group and between-group analyses show a statistically significant difference, which provides strong evidence of the effectiveness of the iNaturalist in fostering knowledge of Philippine flora and fauna and conservation practices among students.

Finally, the results of this study conform to the complementary theories, which show that the iNaturalist citizen science application is effective in fostering students' environmental learning. Consistent with the Theory of Planned Behavior, which highlights that increased knowledge and engagement improve students’ attitudes, perceived behavioral control, and social norms, thereby strengthening students’ intention toward biodiversity conservation. Similarly, the results align with Experiential Learning, which states that hands-on interaction leads to deeper understanding, and with Social Cognitive Theory, which posits that learning occurs through direct interaction with the environment. Lastly, the findings are in coherence with the Citizen Science Framework, which emphasizes the use of technology and its integration into teaching and learning, as it will transform students into active data collectors and contributors, thereby strengthening biodiversity knowledge and conservation practices.

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