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Projected Still Pictures For Effective Teaching And Learning Of Pollination In Secondary School

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Abstract

This paper explored how projected still pictures could be incorporated in teaching and learning of pollination in Secondary Schools. It further gave practical illustration on how to effectively incorporate projected still pictures in teaching and learning of Biology using "Pollination" as content. The paper reported that the incorporation of projected still pictures in teaching stimulates interest and makes teaching more concrete, as images of the topic under discussion are being displayed on large screen using a projector. By extension, applying projected still pictures in teaching also make learning more efficient and less in time consumption. Thus, to enhance interest in learning Pollination, this paper urged that, biology teachers should incorporate projected still pictures in their teaching and learning processes. In view of this and among other recommendations, the writer opined that for efficiency sake, biology teachers should be trained on incorporation of projected still pictures in teaching and learning.

Keywords: Teaching, Learning Pollination, Still Pictures

Introduction

The quest to further understand life is the core concern of modern biology. Biology per se is the scientific study of life. It is a natural science that deals with the living world. According to Otuaka & Uzondu (2009), biology is a natural science that deals with the study of life, forms, structure, function, evolution, distribution, interactions and interrelationship among life. To Orji (2011), biology is a science that treats life as a series of processes whose characteristics may be examined by observations and experimentations. As such, Umar (2012) opined that biology explores how the world is structured, how it functions, what these functions are, how it develops, how living things came into existence and how they interact with one another and with their environment. As

such, biology helps to foster a better grasp of the natural environment.

The importance of biology cannot be over emphasized, as its knowledge has cut across sectors for socio economic and political advancement. Considering the objectives of biology curriculum, biology also aimed at producing proficient professionals, knowledgeable enough to enhance human existence. More so, recent biological discoveries in areas like pollination have given much ground for a boom in agriculture and by expansion economic advancement.

Pollination is the process of transfer of pollen grains from the anther to the stigma of a flower (Agu, 2012). Explicitly, Michael (2018) defined pollination as the transfer of mature pollen grains from anthers of one flower to the mature stigma of the same flower or another flower of the same plant or closely related species. Summarily, one can say that pollination is the exchange of pollen grains within and among flowers. Research advancements in pollination have shown that this transfer of pollen grains within and among flowers can be artificially manipulated (pollen technology) to solve the current global food insecurity. As such, there is every need to foster first hand grasp of pollination among biology students using projected still pictures to appeal to their sense of sight, stimulate and sustain interest.

Projected still pictures (PSP) are media which are visual, static and to an extent auditory in nature which require projection and electricity in their use for teaching and learning situations (Jimoh, 2009). It encompasses motionless pictures that are transferred by the help of light, onto a screen. They are also pictures shown upon a screen by the use of certain type of machine such as film strip projector, slide projector, overhead projector or TV/VCD (Atkinson, 2011). PSP are also media formats in which texts and still images are printed on a transparent film such as an over head transparency or a slide. The printed material or image is being projected onto a screen or wall by passing a strong light through the film and magnifying it onto a light color screen or wall (white board or white wall).

PSP being one of educational resource materials help to keep the learner focused on what is being taught by the teacher in the classroom. They aid at making a lesson more interesting and to create a memorable experience not only for students but for the teacher as well. The main purpose of using projected still pictures in teaching biology (pollination) is to improve the quality of teaching and learning of the topic. Preference to still

pictures as against motion pictures is a means of warding off cognitive distractions among learners. To this end, there is every need for a pragmatic shift to PSP in teaching of pollination.

Application of Projected Still Pictures in Teaching and Learning of Pollination.

Name of teacher: Nnabuife Maryjane.

Class: SS2

Average age: 15+

Number in class: 35

Time: 75 minutes

Subject matter: Pollination

Instructional material: Text book, lesson note, projector, video cassette, real flowers, real butterfly.

Instructional objectives: By the end of the lesson, the students will be able to;

1) Define pollination in flowering plants.

2) Mention types of pollination.

3) Identify and explain the types of pollination.

4) List 5 agents of pollination.

5) Identify and explain two conditions each necessary for both types of pollination.

6) Differentiate between the two types of pollination.

7) Draw a flower and identify the core reproductive organs.

Entry Behaviour: The teacher asks the students to mention the names of different flowers they have seen.

Skills emphasized: Set induction, use of examples, planned repetition, questioning skills and closure.

Instructional procedures

Set induction:

Teacher's Activity: Using a projector, the teacher displays a labeled longitudinal image of hibiscus to expose the internal structures as in fig (a) below and requests the students to itemize the parts as labeled. She further explains that the part labeled "anther" contains "pollen grain" while the part labeled "stigma" contains "egg".

Students' Activity: Students itemize the parts of the flower as labeled and listen attenti

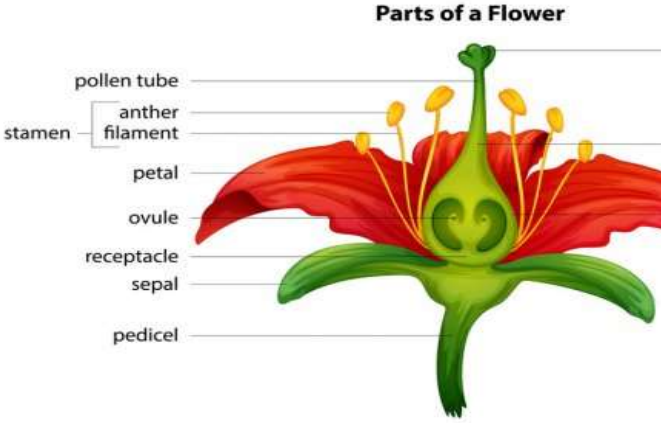

Fig a: parts of a flower
Source:www.scienceworld.ca/resource/flower-dissection/

Step 1: Definition of content.

Teacher's activity: `The teacher defines pollination as the transfer of mature pollen grains from mature anthers to mature stigma of the same flower or another flower of the same species. After giving the definition of pollination, she projects still pictures of how pollination occurs asks the

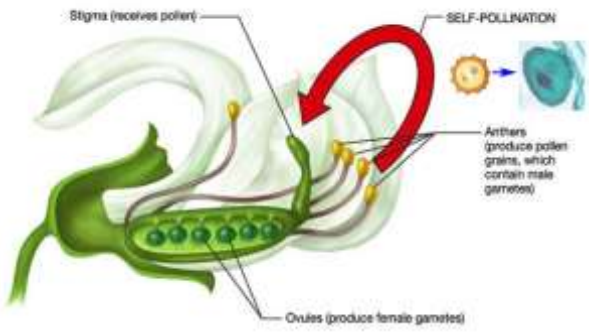

Fig b: Transfer of pollen grains from the anther to the stigma.

Source: https://byjus.com/biology/types-of-pollination/

Students' activity: The students observe the pictures, takes note of what transfer of pollen grain means and identify the anthers and the stigmas of a flower.

Step II: Types of pollination

Teacher's activity: The teacher mentions and explains types of pollination as follows:

There are two major types of pollination.

1) Self pollination: This is the transfer of pollen grains from mature anther of a flower to the mature stigma of the same flower.

2) Cross pollination: This is the transfer of pollen grain from mature anther of a flower to the mature stigma of another flower of the same specie or of close relation.

After the explanations, the teacher uses projected still images of the types of

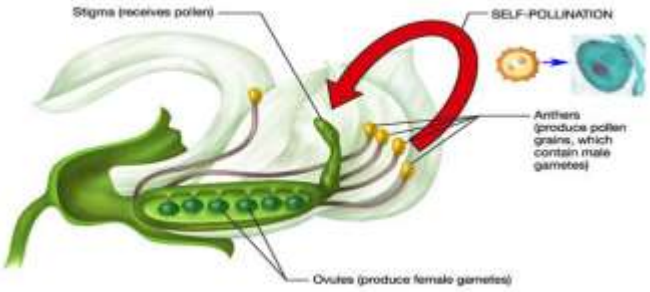

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Fig c (i): Self pollination in a flower

Fig c (ii): Cross pollination

Source: https://byjus.com/biology/types-of-pollination/ **Source:** https://brainly.in/question/2389460

Students' activity: The students observe the various images displayed by the teacher, identify the different pollen transfer, discuss them and make deductions from their observations.

Step III: Agents of pollination

Teacher's activity: The teacher projects pictures of agents of pollination and asks the students to identify them. After the identification, she asks them if they have seen anyone of them in a real life context and then she shows the students a real butterfly for them to feel before going further to explain these agents of pollination as follows:

Agents of pollination are factors that bring about successful pollination or transfer of pollen grains. They are classified into two distinct groups as follow:

Biotic Agents: They are living components of the plant environment which enhance the transfer of pollen grains from the anther to the stigma of flowers. They include the butterfly, birds, man etc.

Abiotic Agents: They are non-living components of the plant environment which enhance the transfer of pollen grains from the anther to the stigma of flowers. They include the wind, water etc.

Fig d (i): different agents of pollination.
Fig d (ii): a bee pollinating a flower.
Source:www.qsstudy.com/biology/pollinating-agents

Fig d (iii): a bird pollinating a flower.
Fig h: a wind pollinated flower.

Source:www.sciencelearn.org.nz/resources/

Source: Bauhoulz (2018)

Students' activity: The students observe and identify the different agents of poll

also feel the real butterfly to know exactly what it's like, answer the questions asked by the teacher and then write down what they have observed.

Step IV: Conditions necessary for pollination.

Teacher's activity: The teacher projects different still pictures of conditions that supports the two types of pollination and asks the students to observe, identify and write down the differences they noticed from the pictures. After the exercise, she goes ahead to verbally explain these conditions that support the types of pollination as follows:

Conditions that Support the two types of Pollination: There are special situations that must be on ground or readily available in a flower to enable a particular type of pollination to occur. In order words they are called pollination facilitating factors. Pollination facilitating factors for self pollination include: Homogamy and Cleistogamy. While the pollination facilitating factors for cross pollination are: Dichogamy, Unisexuality and Self Sterility.

1) **Homogamy:** This refers to a situation where the anther and the stigma of a bisexual flower mature and ripen at the same time. Under this condition a gentle breeze may blow off mature pollen grain directly into the flower's stigma or a visiting insect may displace the pollen grain giving rise to self pollination.

Fig e (i): Homogamy

Source:https://letstalkscience.ca/educational-resources/stem-in-context/pollinators-are-important

2) **Cleistogamy:** This refers to a situation in a flower, when the anther matures before the stigma but the stigma matures and ripens immediately a pollen grain from the anther falls on it.

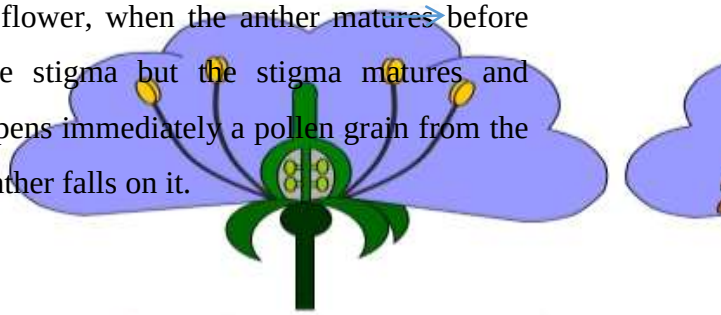
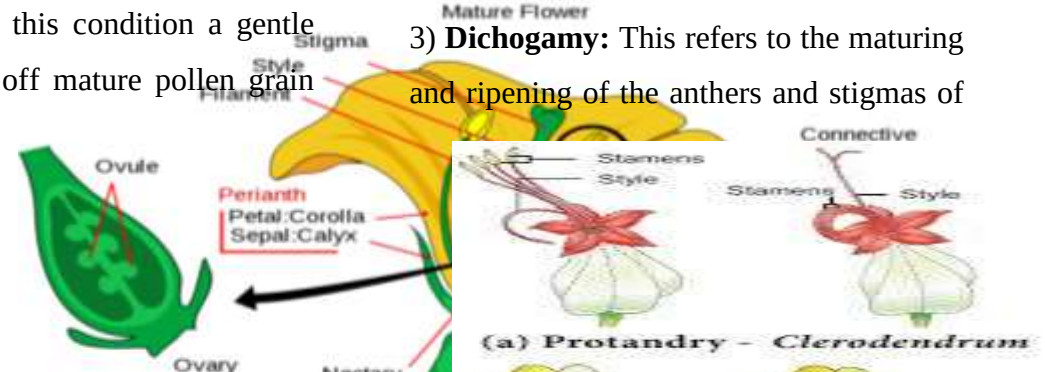


Fig e (ii): Illustrations of Cleistogamy

Source: Hayden & Fagan (2016)

3) **Dichogamy:** This refers to the maturing and ripening of the anthers and stigmas of



two bisexual flowers at different time. The anther may mature first (protandary) or the stigma matures first (protogamy).

Fig e (iii): Illustration Dichogamy

Source:
http://www.brainkart.com/article/Cross---pollination

4) **Unisexuality**: This is a condition in which a plant bears only the male or female flowers. It occurs only in unisexual flowers unlike in the bisexual. The floral parts of such flower may either be a combination of calyx, corolla and androecium (male) or calyx, corolla and gynoecium (female). Under this situation, cross pollination remains the only remedy for fertilization. The flowers concerned may bear only the anther or the stigma.

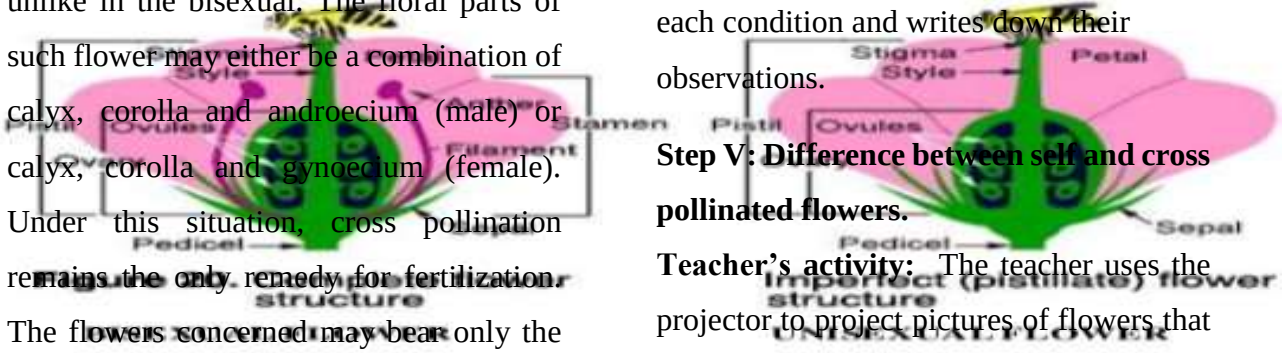


Fig e (iv): Illustration of Unisexuality
Source: https://www.pmfias.com/sexual-asexual-reproduction-plants/

5) **Self Sterility:** This refers to situation in which some flowers make themselves sterile. They may produce sterile anthers and fertile stigmas or sterile stigmas and fertile anthers.

Fig e (v): Illustration of Self Sterility

Source: Ferrer & Good (2012)

Students' activity: The students carefully examine the pictures provided, identify the states of the anthers and the stigmas under each condition and writes down their observations.

Step V: Difference between self and cross pollinated flowers.

Teacher's activity: The teacher uses the projector to project pictures of flowers that show the differences between self and cross pollination and tells the students to identify their differences. She also asks the students to mention the differences between the two types of pollination they have observed so far. After the exercise by the students, she further displays written differences between self and cross pollination and asks the students to repeat them continuously.

Differences between the Two Types of Pollination

Self Pollination	Cross Pollination
1) Self pollination occurs only in bisexual flow ...both bise... . and	1) Cross pollination occurs in both bisexual and unisexual flowers
2) Self pollination involves only one parent flower	2) Cross pollination often involves two parents
3) Pollination may occur on its own without external agents.	3) Pollination must be initiated by an external agent.
4) No new species is formed from fertilization.	4) New specie is formed from fertilization.
5) Pollen grains are used effectively	5) Pollen grain may be wasted due to long distance covered.

Figure 20. Complete flower structure

BISEXUAL FLOWER

Fig f (i): Bisexual Flower with Anthers and Stigmas **Fig f (ii):** Bisexual and sexual Flowers

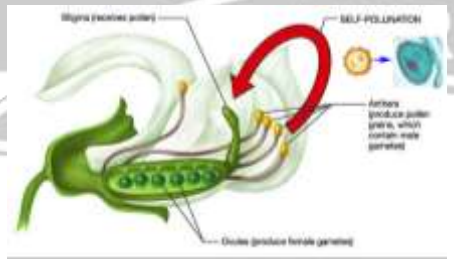


Fig f (iii): a self Pollinated flower **Fig f (iv):** cross pollination

Students' activity: The Students examine the pictures, identify the differences between the pictures, give their own ideas on the differences between the two types of pollination and then take part of the repet...

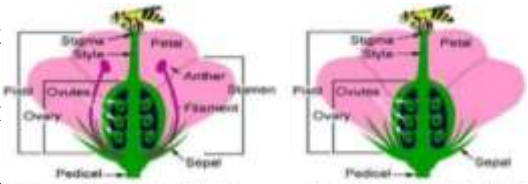


Figure 20. Complete flower structure

BISEXUAL FLOWER

Imperfect (pistillate) flower structure

UNISEXUAL FLOWER

Sum

Teac... the l... again and then asks the students to identify each picture. She goes further to divide the students into two groups and asks them to use well labeled diagrams to show the two types of pollination.

Students' activity: The students identify the pictures and take part in the drawing exercise.

Evaluation:

Teacher's activity: The teacher evaluates the students by asking them the following questions:

1) Define pollination.

2) ...

3) ...

4) ... types of pollination to take place

5) Mention 5 differences between self and cross pollination.

6) Mention 5 parts of a flower.

Students' activity: The students provide correct answers to the questions asked.

Conclusively, integrating projected still pictures in the teaching and learning of pollination in flowering plants makes teaching and learning of the concept quite interesting and instructional content adequately digested and assimilated by the students. Learning is entirely student centered and activity oriented providing for a hand-on-mind experience through proactive and value oriented interaction among students and with the pictures and specimens provided. Biology teachers should therefore, incorporate PSP in teaching their students for easier instruction and for assimilation of biology concepts by the students. In addition, the use of projected still pictures shouldn't replace teaching with real objects rather, it should be supplemented with real objects where necessary for the students to be able to see as well as feel the object.

Recommendations

1) Government at all levels should provide schools with equipment to facilitate the use of projectors and allied facilities in teaching of biology.

2) Conferences and workshop should be organized to train and encouraged biology teachers on use of projected still pictures so as to enhance the interest and motivation of students.

3) Curriculum planers should realize the importance and effectiveness of projected still pictures and make it a part of teacher education programs so that teachers are trained in proper use of projectors.

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