

**TECHNICAL REPORT ON STUDENTS INDUSTRIAL WORK
EXPERIENCE SCHEME (SIWES)**

**AT
ST. AUGUSTINE MEDICAL DIAGNOSTIC LABORATORY,
AWKA, ANAMBRA STATE**

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TECHNOLOGY**

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DEDICATION

This technical report is dedicated to Almighty God and to my beloved parents for making my SIWES experience successful.

ACKNOWLEDGEMENTS

I thank God Almighty for making me to undergo students industrial work experience scheme (SIWES) successfully.

My gratitude goes to my parents for their prayers, financial and moral support during my attachment.

I whole heartedly thank my Head of department Mr. Yakubu Sule, SIWES coordinator and all lectures of Science Laboratory Technology, for their effort to ensure my success as their student.

I acknowledge the support and guidance of my industry-based supervisor for his time and support throughout my SIWES program at St. Augustine Medical diagnostic laboratory, Awka, Anambra State.

I also appreciate the kind gesture of my brothers and sisters and those who supports me in prayers and contribution during my industrial attachment.

I am greatly indebted to my co-SIWES students to mention, may God strengthen our relationship together and grant us academic excellence.

I sincerely thank you all for your contribution and support.

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CHAPTER ONE

INTRODUCTION

The Student Industrial Work Experience Scheme (SIWES) was designed by the Federal Government Establishment by decree No. 47 with statutory responsibility of man power training to bridge the gap between theoretical class work and the actual practical experience which is really what the labor market require of a graduate.

The program was established in 1973 and board as industrial Training Fund (ITF) with the view of generating trained manpower sufficient to meet the needs of the country's development plan. Despite the obstacles and huddles such as accommodation problems during the program, these are worthy adventure. I salute the pioneers and right-thinking person that initiate (SIWES) (Yusuf, 2012).

1.1 Aim and Objectives of SIWES

The aim and objectives of SIWES is to bridge the gap between theories learned and the practical aspect found in the field or industry as it may be. In addition, the following are some of the aim and objective.

- i. To strengthen the relationship between institution of learning and the industries.
- ii. To expose and prepare student for the industrial challenges that is likely to be encountered in the future.
- iii. To create the mind set of industrial based skills necessary for smooth transition from class room to the world of application (field) after graduation.
- iv. To expose students to know how to handle, maintain and make use of tools and equipment that may not be available at their institutions of learning.
- v. The SIWES also aims at preparing student for work after graduation (Yusuf, 2012)

1.2 Aim and objectives of Industrial Training Fund (ITF)

- i. To provide materials, logistics and firm for the smooth running of the training.
- ii. Organizes orientation for the prospective student to prepare them before going to the field.
- iii. Formulate policies for suitable and smooth running of the scheme.
- iv. Provide insurance cover for student on SIWES (Yusuf, 2012)

1.3 Role of students

The students are beneficiaries of the scheme and therefore have a role to play which include.

- i. To be regular and punctual at all times.
- ii. To attend SIWES orientations organized by the ITF before going out to the field.
- iii. To be obedient and adhere to the rules and regulations of the organization in which the student is undergoing the training.
- iv. Report daily activities carried out by the student in the log book.
- v. To avoid changing places of attachment unnecessarily.
- vi. To be diligent, honest and take pride in the organization (Yusuf, 2012)

1.4 History of St. Augustine Medical Diagnostic Laboratory

St. Augustine Medical Diagnostic Laboratory has a rich history that dates back to its establishment in the early 1990s. The laboratory was founded by Dr. John Obi, a renowned medical professional with a vision to provide high-quality diagnostic services to the residents of Awka and its surrounding regions. Dr. Obi recognized the need for a reliable and comprehensive medical diagnostic facility in the area. With the aim of bridging the healthcare gap and improving patient care, he embarked on the journey of creating St. Augustine Medical Diagnostic Laboratory. In the beginning, the laboratory started as a modest facility with a limited range of diagnostic tests. However, due to Dr. Obi's dedication and commitment to excellence, the laboratory quickly gained a reputation for its accurate results,

prompt service, and compassionate patient care. Over the years, St. Augustine Medical Diagnostic Laboratory experienced remarkable growth and expansion.

As the laboratory's reputation grew, so did its clientele. Physicians, clinics, and hospitals in Awka and neighboring areas increasingly relied on St. Augustine Medical Diagnostic Laboratory for accurate and timely diagnostic reports to aid in patient management and treatment decisions. In addition to its diagnostic services, the laboratory actively participated in community health initiatives, conducting health camps, and offering health awareness programs. Today, St. Augustine Medical Diagnostic Laboratory stands as a beacon of excellence in medical diagnostics in Awka, Anambra State. It continues to uphold its core values of integrity, accuracy, and patient-centric care, providing reliable diagnostic services that contribute to improved healthcare outcomes in the region (Akpan, 2023).

1.5 Organization Chart of St. Augustine Medical Diagnostic Laboratory.

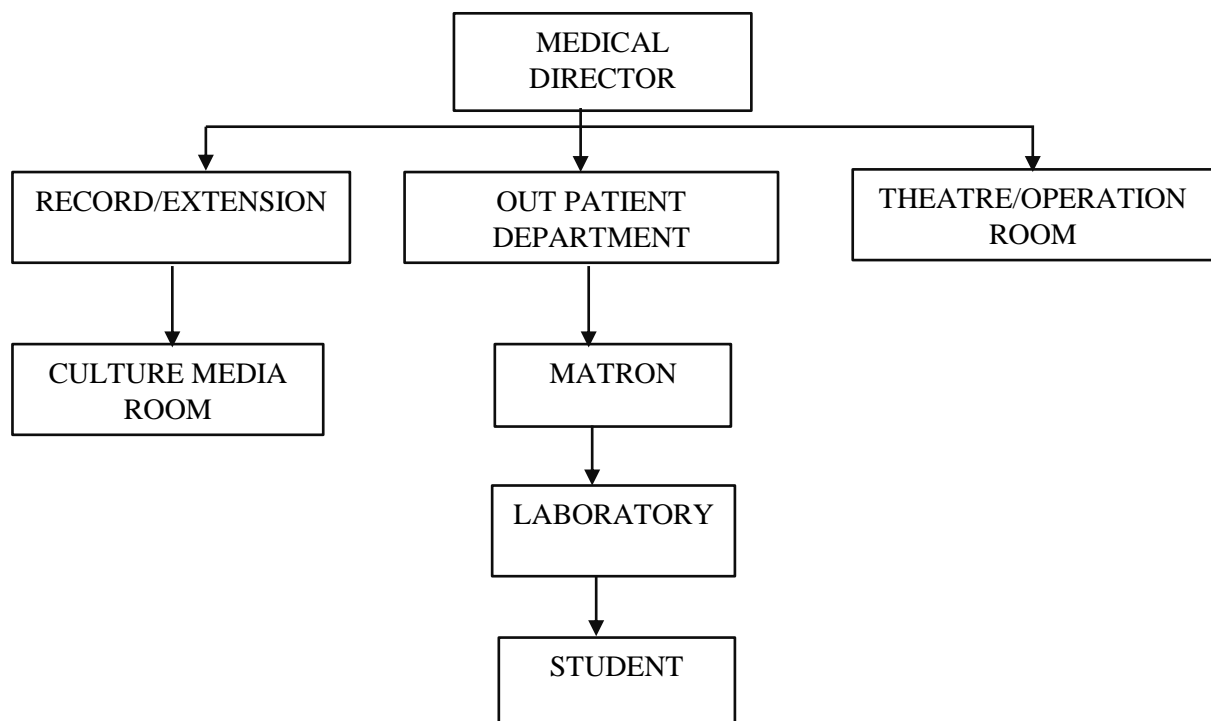


Figure 1: Organization Chart

1.6 Rules and Regulations in the Laboratory

- i. Do not enter the medical laboratory bare footed.
- ii. Do not eat in the medical laboratory
- iii. Do not discuss patient result with them or their relative unless you ask to do so by the medical director or any of your supervisor.
- iv. You should not open your mouth while wild open while laughing in the medical laboratory, you can just smile.
- v. Always label your sample in the medical laboratory to avoid misinterpretation of result.
- vi. Be your patient companion always be kind to your patient well, counsel them well and make them feel at home in the medical laboratory (Akpan, 2023).

CHAPTER TWO

PARASITOLOGY UNIT

Parasitology is the branch of biology or medicine concern with the study of parasitic organism. Tests done under this unit include (Hoffman *et al.*, 2018).

2.1 Method of Blood Sample Collection

There are two ways medically through which blood sample can be collected. The ways are as follows:

- a. Through vein
- b. Through capillary

2.1.1 Vein Blood Sample Collection

Materials required: Swap, EDTA container, Tunicate, Syringe and Needle.

Procedure:

- i. The patient hand was tied with a tunicate
- ii. The preferred area of the patient was wiped using a swap, so that the vein will be seen clearly.
- iii. The patient was introduced to close his tied hand fingers so that the vein will pump up.
- iv. Then about 1/3 of the needle was inserted into the vein and the plump of the syringe was drawn back for the blood sample to be collected.
- v. After the blood sample was collected, the tunicate was untied first before the needle was removed from the vein.
- vi. Then the blood sample was transferred into the EDTA container.

2.1.2 Capillary Blood Sample Collection

Materials required: Swap, EDTA container, Lancet.

Procedure:

- i. The patient's finger was wiped using a swap.
- ii. The wiped area was pricked with a lancet.

- iii. The finger was pressed gently for free flow of blood.
- iv. Then the blood sample was collected into the EDTA container.

2.2 Malaria Parasite (MP) Method A

Aim: To diagnose plasmodium Falciparum in the blood.

Materials: Staining racks, Anti-coagulant container, cotton wood, Microscope, micro slide, Syringe, tourniquet, spirit swap.

Procedure:

- i. The skin was cleaned with swap.
- ii. An elastic band (tourniquet) was put above the area to get the veins to swell with blood. (Usually in the arm inside of the elbow or on the back of hand)
- iii. The blood sample were pulled into a syringe.
- iv. The elastic band was taken off and the needle was removed from the vein.
- v. The blood sample was poured into an anticoagulant container.
- vi. Cotton wool was used to clean the micro slide properly.
- vii. A thick blood film was made on a grease free micro slide.
- viii. It was left to dry under room temperature.
- ix. The film was placed on a staining rack
- x. It was washed with waster to remove excess of stain from the thick film.
- xi. It was allowed to dry under room temperature.
- xii. Oil immersion was added on the thick film
- xiii. It was mounted on the micro scope stage and observed using high power objective.

Result

Any sign of blue dot on the film it is positive for malaria parasite.

Ratings 0 – 5 dots 1 plus, 5 – 10 dot 2 plus, 10 – 15 dot 3 plus, 15 – 20 dot 4 plus.

And if there is no blue dot it is negative for malaria parasite

2.3 Malaria Parasite (MP) method B

Specimen: Blood

Reagent: Buffer Solution

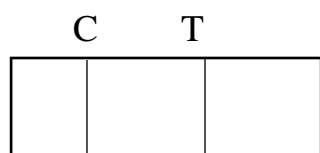
Materials: Malaria kit, wire loop, anti-coagulant container syringe, tourniquet, spirit swap.

Procedure:

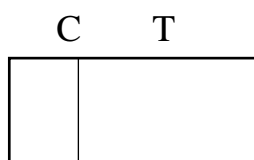
- i. The tourniquet was put above the area to get the veins to swell with blood.
- ii. Inserted a needle into a vein (usually in the arm inside of inside of the elbow or on the back of the hand)
- iii. The tourniquet was taken off and the needle removed the needle from the vein.
- iv. The wire loop was used to pick some blood sample from the anticoagulant container.
- v. Inserted it in to sample space.
- vi. Added two to four drops of buffer in the space provided for it.
- vii. Observed and saw the result after 15 to 20 minutes

Result

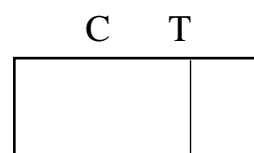
- i. If there is a line on the test column and on the control column the result is positive for malarial parasites.
- ii. And if there is only one line on the control column and non on the test column it is negative for malaria Parasite.
- iii. If there is a line on the column and non on the control column it is invalid.
- iv. If there is no line on the control and test column is still invalid.



Positive



Negative



Invalid

2.4 Urine analysis

It is used to detect and manage a wide range of disorders, such as urinary tract infections, kidney disease and diabetes.

Aim: To detect the normality or abnormality of urine.

Urine Analysis Test Procedure:

- i. The urine was collected in a clean container.
- ii. The urine sample was poured on a test strip and allowed for 60 seconds.
- iii. The colour chart on a test strip was compared with the colour chart provision on the container of the test strip before the result was interpreted.

Result:

- i. The observation of the result depends on the colour change on the strip if any.
- ii. Then the strip was compared with the colour of the parameter of the combi 9 strip container.

2.5 Urine Microscopy Test

It is used to detect and manage a wide range of disorders, such as urinary tract infections, kidney disease and diabetes.

Aim: To detect the normality or abnormality of urine.

Urine Microscopy Test Procedure:

- i. The urine was collected in a test tube.
- ii. The urine sample was placed into the centrifuge machine. The machine was allowed for 5 minutes before sample removed.
- iii. The urine sample was removed and placed on a clean slide.
- iv. The result was interpreted after the slide was placed under microscope and observed using x100 objective lens.

Result:

- i. The observation of the result depends on the colour change on the strip if any.
- ii. Then the strip was compared with the colour of the parameter of the combi 9 strip container.

CHAPTER THREE

HAEMATOLOGY UNIT

Hematology is the study of blood in its normal and abnormal condition and the tests carried out under this unit include (Hoffman *et al.*, 2018).

Packed Cell Volume

A B O Grouping

3.1 Packed Cell Volume (PCV)

Aim: To know or detect the amount of blood in the body

Specimen: Hematocrit centrifuge, hematocrit chart, heparinized capillary tube, syringe, tourniquet, anticoagulant container sealer, spirit swap.

Procedure:

- i. The skin was cleaned with spirit swap.
- ii. The tourniquet was put above the area to get the veins to swell with blood.
- iii. Inserted the needle into a vein (either in the arm inside of the elbow or on the back of the hand)
- iv. Pulled the blood sample into the syringe
- v. Took off the tourniquet and remove the needle from the vein
- vi. Used the capillary tube pipet to take blood sample to the brim end of the capillary tube.
- vii. Used the sealer to seal the end part of the capillary tube
- viii. Put capillary tube containing the blood sample into the hematocrit centrifuge.
- ix. Spin for five minutes, then stop the centrifuge.
- x. Removed the capillary tube and introduce it to the hematocrit chart.

Write your result from 0-100% for example it may be 0%, 15%, 25%, 30% etc.

Packed Cell Volume (PCV):	Range
Children at birth	44 – 54 %
Children 2 – 6 years	35 – 40 %
Children 6 – 12 years	34 – 45 %
Adult Men	40 – 54 %
Adult Women	36 – 46 %

3.2 ABO Grouping

Aim: To help identify the blood group of an individual

Specimen: Blood

Reagent: ABO grouping sera (anti A, B, and Orh)

Materials: White surface tile, Pasteur pipette, stirrer, toilet tissue, syringe tile, Pasteur pipette, stirrer, toilet tissue, syringe, tourniquet, swap.

























Procedure:

- i. Cleaned the skin with swap
- i. Put a tourniquet above the area to get the veins to swell with blood.
- ii. Inserted a needle into a vein either on the back of the hand or in the arm inside of the elbow.
- iii. Pulled the blood sample into the syringe
- iv. Took off the tourniquet and remove the needle from the vein and pour the blood on the white surface tile in different places.
- v. Added anti A, anti B and Orh on each drop of blood on the white surface tile.
- vi. Used the stirrer to mix both reagent and blood sample properly.
- vii. Rock from 0 -1 minute and read your result.

Result

- i. If anti-A agglutinate, and no agglutination in anti B and ORh agglutinate it is A positive.
- ii. If there is agglutination in anti A and non in anti B and ORh it is A negative.

- iii. If there is agglutination in anti A, and anti B and ORh it is Ab positive.
- iv. If there is no agglutination in anti A and there is in anti B and ORh it is B positive.
- v. If there is no agglutination in anti A and there is in anti B but non in ORh it is B negative.
- vi. If there is no agglutination in anti A, anti B but there is in ORh it is O positive.
- vii. If there is no agglutination in anti A, anti B and ORh it is O negative.

A	B	O _{Rh}	
			A+    0+
			A-    0-
			AB+
			AB-
			B+
			B-

3.3 Introduction to immunology

This is the study of human immunity and tests done under this unit include

Pregnancy test (PT)

Retro viral screening or syndrome (RVS)

3.4 Pregnancy Test (PT)

Aim: To detect HCG in a female blood or urine

Specimen: blood serum or early morning urine

Material: pregnancy test strip, test tube

Procedure:

- i. unveiled the pregnancy strip
- ii. Inserted the PT strip into the blood serum or early morning urine in the test tube.
- iii. Made sure the strip stick is covered to the marked point by either of the sample used.
- iv. Allowed to stand for some few minutes and then remove the strip stick from the sample and observe.

Result

- a. If there are two lines at both the control and test column it is positive for pregnancy test.
- b. If there is only one line at the control column and non at the test column is negative for pregnancy test.
- c. If there is one line at the test column and non at the control column the result is invalid.
- d. If there are no lines at both the control and the test column is still invalid.

3.5 Retro viral syndrome/screening (RVS)

Aim: To detect immune virus in the blood

Specimen: Blood Serum

Reagent: Buffer Solution

Materials: RVS strip, Pasteur pipette

Procedure

- Unveiled the RVS strip
- Used Pasteur pipette to make one or two drops of serum on the space provided
- Added buffer, to re-dilute the serum

Result

- If there are two lines at both control and test column it is positive for RVS test
- If there is only one line at the control column and non at the test column it is negative for RVS test.
- If there is only one line at the test column and non at the control column the result is invalid.

CHAPTER FOUR

CHEMICAL PATHOLOGY UNIT

This is the study of chemicals and test carried out under this unit include (Hoffman *et al.*, 2018).

FBS/RBS (fasting blood sugar and random blood sugar)

Widal Test

Hepatitis B surface Antigen

Hepatitis C Virus

4.1 Fasting Blood Sugar and Random Blood Sugar (FBS/RBS)

Aim: to determine the glucose level of a patient

Specimen: blood

Materials: dry cotton wool, test strip, pipette, lancet swap glucose meter.

Note: fasting blood sugar is the type of test in which the patient is required to fast (abstain from food for 12 hours after which the sample can be collected).

While random blood sugar can be collected at any time.

Procedure:

- i. The glucose meter was put on and inserted the test strip into it
- ii. The finger was cleaned using the spirit swap
- iii. The lancet was used to pick the area cleaned
- iv. The finger were squeezed so as to make a drop on the test strip
- v. The result was read after few munities

Result test	Normal range
Fasting blood sugar	3.0 – 6.0 mm0l/l
Random blood sugar	3.0 – 8.0 mmol/l

4.2 Widal Test

Aim: To diagnose typhoid in the blood

Specimen: Blood serum

Reagent: Salmonella antigen sera

Apparatus: White surface tile, Pasteur pipette, stirrer, tourniquet, syringe, spirit swap.

Procedure

- i. Cleaned the skin with spirit swap
- ii. Put a tourniquet above the area to get the veins to swell with blood
- iii. Inserted the needle into a vein either in the arm inside of the elbow or in the hand
- iv. Pulled the blood sample into the syringe
- v. Took off the tourniquet and remove the needle from the vein
- vi. Poured the blood into an anti-coagulant container.
- vii. Allowed the blood to stand for some time in order to get the serum.
- viii. Eight drops of serum were put on a white surface tile using your Pasteur pipette.
- ix. Added salmonella antigen sera drops in each of the eight of the serum on the tile.
- x. Used the stirrer to mix both the serum and the reagent properly and rock from 0 -1 minute.

Result

- i. Observe if there is thick agglutination the result is positive for typhoid fever titre 1 in 320.
- ii. If the agglutination is fairly thick it is still positive for typhoid fever titre 1 in 160.
- iii. But if there is no agglutination it is negative for typhoid fever the titre could be 1 in 120, 1 in 40, and 1 in 80.

4.3 Hepatitis B surface antigen (HBsAg)

Aim: To detect the presence or absence of genetic material (RNA) (the virus that causes hepatitis).

Materials required: Swap, Tunicate, Blood sample (serum), centrifuge, HBsAg test strip, 2ml syringe and needle, EDTA container.

Method:

- i. The collected sample was transferred into EDTA container
- ii. The container was then placed inside the centrifuge and was spin for 5 minutes.
- iii. The HBsAg strip was deep inside the serum for some moment and removed, then it was allowed to stay for 5 minutes.
- iv. Lastly the result was observed.

Result:

- a. When both the test line and control line appeared, the person is said to be positive.
- b. When only the control line appeared, the person is said to be negative
- c. When none of the line appears, the strip is said to be invalid
- d. When only the test line appears, the strip is said to be invalid.

4.4 Hepatitis C test (HCV)

Aim: To detect the presence or absence of a genetic material (RNA).

Materials required: Swap, Tunicate, Blood sample (serum), centrifuge, HCV test strip, 2ml syringe and needle, EDTA container.

Procedure:

- i. The collected sample was transferred into EDTA container
- ii. The container was then placed inside the centrifuge and was spin for 5 minutes.
- iii. The HCV strip was deep inside the serum for some moment and removed.

- iv. The HCV test strip was allowed to stay for 5 minutes.
- v. Lastly the result was observed.

Result:

- a. When both the test line and control line appeared, the person is said to be positive.
- b. When only the control line appeared, the person is said to be negative
- c. When none of the line appears, the strip is said to be invalid
- d. When only the test line appears, the strip is said to be invalid.

4.5 Venereal Disease Research Laboratory (VDRL) Test

Aim: To detect the presence or absence of antibodies against the bacterium *Treponema pallidum*.

Materials required: Swab, Serum or plasma sample, centrifuge, syphilis test kit (enzyme immunoassay or rapid test), pipette, disposable tips.

Procedure:

- i. Collected a swab sample or obtain a serum or plasma sample from the individual suspected of having syphilis.
- ii. If using a swab sample, gently swab the suspected lesion or site of infection to collect a sample. If using a serum or plasma sample, collect the blood sample using a syringe and needle, and transfer it into a clean, labeled tube.
- iii. If using a blood sample, allow the tube to stand for a few minutes to allow clotting. Then, centrifuge the tube containing the blood sample at a specified speed and time to separate the serum or plasma from the clot.
- iv. Carefully transfer the serum or plasma into a new, labeled tube, avoiding any contamination.
- v. Open the syphilis test kit, ensuring that it is within the expiration date and that the kit components are intact.

- vi. Using a pipette and disposable tips, add the appropriate volume of the collected serum or plasma sample to the designated well(s) on the test kit device as per the manufacturer's instructions.
- vii. Allow the test to run for the specified time, usually around 10-15 minutes, without disturbing the device.
- viii. After the recommended incubation time, observe the result window on the test kit device.

Result:

- a. If both the test line and control line appear, the person is considered positive for syphilis.
- b. If only the control line appears and the test line is absent, the person is considered negative for syphilis.
- c. If neither the test line nor the control line appears, the test is considered invalid and should be repeated.
- d. If only the test line appears and the control line is absent, the test is considered invalid and should be repeated.
- e. Record the result and take appropriate action based on the test outcome, such as confirming the diagnosis with additional tests or consulting a healthcare professional.

CHAPTER FIVE

CONCLUSION AND RECOMMENDATIONS

5.1 Conclusion

This Student Industrial Work Experience Scheme attachment program has really enlightened us a lot of things that we have not done during our theoretical study and it also exposed us to many principles, test and some machines that we have not seen or handled before.

5.2 Recommendations

This student industrial work experience scheme (SIWES) at St. Augustine Medical diagnostic laboratory, Awka, Anambra State was interesting; some students find it difficult to carry out some of the test with modern equipment in the laboratory. Likewise, there was restriction on some of the equipment which is only operated by the specialist in the establishment. In this respect I am pleading with the government to provide modern equipment to schools. The students should be given opportunity to operate the available equipment in school laboratory (Physics, Chemistry, and Microbiology).

Secondly the ITF official should try to visit establishment where students are undergoing their SIWES program.

Finally, my advice to incoming student who may undergo their course of study and the establishment should be equipped with modern equipment.

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