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# APPENDICES

**Appendice A1: Pekeliling Ikhtisas Bil. 7/2002**
**Perlaksanaan Mata Pelajaran EST**

**– http//www.moe.gov.my**

**Appendix A2: Pekeliling Ikhtisas Bil. 11/2002:**
**Perlaksanaan Pengajaran dan Pembelajaran Sains dan Matematik Dalam Bahasa Inggeris Mulai Tahun 2003**

**– http//www.moe.gov.my**

Samsiah Abdul Hamid
Program Pengajian Doktor Falsafah
Fakulti Pendidikan
Universiti Malaya
50603 Lembah Pantai
Kuala Lumpur

Kepada,

Dr. Noraznawati Ismail
Jabatan Sains Biologi
Fakulti Sains dan Teknologi
Universiti Malaysia Terengganu
21030 Mengabang Telipot
Kuala Terengganu

13 Mei 2007

Puan,

**Permohonan Menilai Teks Sains (Biologi) Untuk Tujuan Penyelidikan**

Dengan segala hormatnya perkara di atas dirujuk. Untuk makluman puan, saya sedang menjalankan penyelidikan untuk memenuhi syarat ijazah kedoktoran dalam bidang Teaching of English as a Second Language (TESL) di Universiti Malaya, Kuala Lumpur.

2. Penyelidikan yang akan saya jalankan bertajuk *Metacognitive and Cognitive Strategies in Reading Scientific Texts Amongst Malaysian Science Undergraduates.* Kajian ini bertujuan mengenalpasti strategi pembacaan berkesan yang digunakan oleh pelajar sains tahun satu (jurusan biologi) dalam usaha memahami teks sains dalam bahasa Inggeris di peringkat pengajian tertiari.

3. Dilampirkan empat jenis bahan untuk tindakan dan maklumbalas puan:

(a) Borang soalselidik latarbelakang ringkas puan

(b) Enam teks saintifik (biologi) untuk penilaian tuan/puan yang mana tiga yang terbaik dan memenuhi kriteria penyelidikan akan digunakan sebagai instrumen kajian ke atas pelajar-pelajar tahun satu semester dua, jurusan sains biologi di tiga buah universiti awam tempatan.

(c) Borang soalselidik bertajuk *Penilaian Teks Saintifik untuk Bacaan Penuntut Tahun Satu Semester Dua, Jurusan Sains Biologi.*

(d) Soalan-soalan kefahaman untuk setiap teks berserta skema jawapan.

4. Saya pohon kerjasama puan untuk membuat penilaian terhadap keenam-enam teks saintifik (biologi) dan seterusnya mengisi borang soal selidik yang dilampirkan. Saya akan datang secara personal mengambil kesemua borang soalselidik yang telah siap diisi dari tuan/puan. Pohon hubungi saya di talian 019-9360553 (hp) atau 09-6665553 (rumah).

**4. Kerjasama pihak puan amat saya perlukan dalam menjayakan kajian ini. Komen membina, cadangan-cadangan penambahbaikan dan pembetulan-pembetulan yang dibuat serta sokongan puan didahului dengan ucapan ribuan terima kasih. Sekian.**

**Yang benar,**

**(SAMSIAH ABDUL HAMID)**

No. Pendaftaran Pascasiswazah: PHA050046
Emel: samsiah@umt.edu.my

Alamat surat-menyurat:

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21300 Kuala Terengganu
Terengganu

No Kad Pengenalan/
*NRIC:*

| | | | | | | - | | | - | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|

# TEXT A

## AUXINS AND ELONGATION OF CELLS

Source:

Campbell, N. A., Mitchell, L. G., & Reece, J. B. (2000). *Biology: Concepts and Connections* (3rd ed.). San Francisco, CA: Addison & Wesley Longman, Inc.

**Arahan:**

Sila baca dan **cuba sedaya upaya anda untuk memahami** teks saintifik yang dilampirkan. Selepas anda memahami topik perbincangan itu dan telah bersedia untuk menjawab soalan (dalam bentuk esei dan objektif) berdasarkan teks ini, sila ketepikan teks ini. Anda **TIDAK BOLEH boleh merujuk** kepada teks semasa menjawab soalan-soalan kefahaman. Anda dialu-alukan untuk membuat sebarang tanda, garisan, nota, lukisan dan lain lain catatan untuk membantu kefahaman anda di atas teks ini. Selamat membaca. [Untuk peringatan anda, terdapat satu lagi teks untuk dibaca iaitu TEKS B dalam kajian ini.]

***Instruction:***

*Please read and try your **very best to understand** the content of the scientific text provided. When you have understood the topic and are ready to answer the questions (one short essay and some objective questions) based on the text, please put this text aside. You **CANNOT refer** to the text while answering the comprehension questions. You are welcome to make any markings, underlining, notes, drawing etc on the text as you please.*

**Introduction**

Plant biologists have identified five major types of plant hormones; **auxins**, **cytokinins**, **gibberellins**, **abscisic acid** (ABA), and **ethylene**. Like animals, plants produce hormones in very small amounts, but a minute amount of any of these chemicals can have profound effects on the target cells. Hormones stimulate growth by signaling target cells to divide or elongate; some of the hormones inhibit growth by depressing cell division or elongation.

**What is auxin?**

Auxins, the first plant hormones to be discovered, have been demonstrated to be a basic coordinative signal of plant development. Their pattern of active transport through the plant is complex, and auxins typically act in concert with (or opposition to) other plant hormones. For example, the ratio of auxin to cytokinin in certain plant tissues determines initiation of root versus shoot buds. As a result, a plant can (as a whole) react on external conditions and adjust to them, without requiring a nervous system.

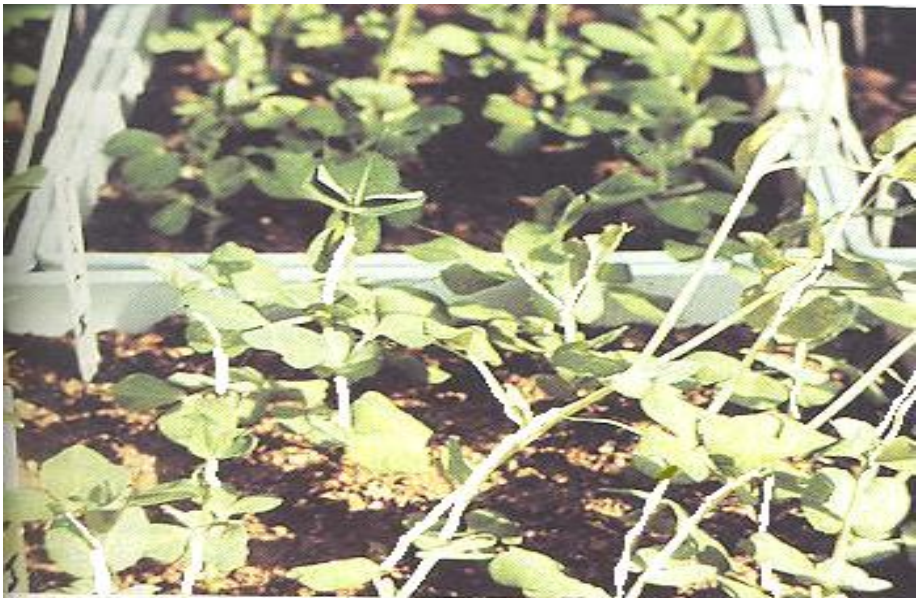

Figure 1 The effect of auxin (IAA) on pea plant

The term auxin is used to describe a class of chemicals whose chief function is to promote the elongation of developing shoots. Several auxins occur naturally in plants, and many others have been synthesized by chemists. The natural auxin that has been

extracted from plants is a compound named **indoleacetic acid**, or IAA. Figure 1 shows the effect of IAA on growing pea plants. All the seedlings in the photograph were grown under controlled conditions for the same length of time except for one difference; the taller seedlings, on the right, were treated with IAA.

The major site of auxin synthesis in a plant is the **apical meristem** at the tip of a shoot. A meristem (Greek *meristos*, divided) consists of localized, unspecialized cells that divide and generate new cells and tissues. As auxin produced in the tip moves downward, it stimulates growth of the stem by making cells elongate An important principle of plant organization based upon auxin distribution is **apical dominance**, which means that the auxin produced by the apical bud (or growing tip) diffuses downwards and inhibits the development of ulterior lateral bud growth, which would otherwise compete with the apical tip for light and nutrients. Removing the apical tip and its suppressive hormone allows the lower dormant lateral buds to develop, and the buds between the leaf stalk and stem produce new shoots which compete to become the lead growth. This behavior is used in pruning by horticulturists.

**The Effects of IAA Concentration Levels on Target Cells**

IAA promotes cell elongation in stems only over a certain concentration range, as the second (thick) curve in the Figure 2 shows.

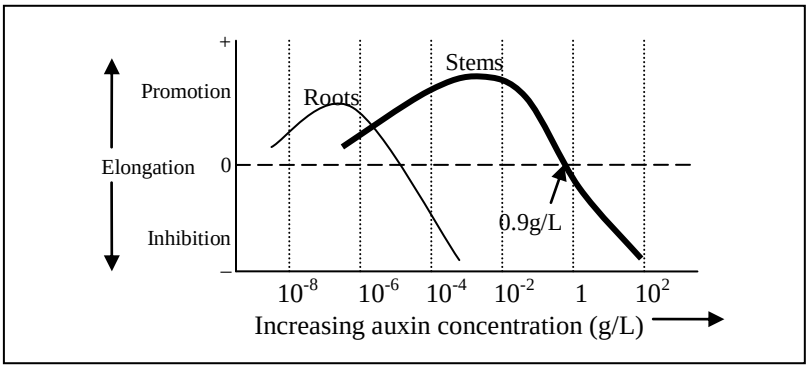


Figure 2 The effect of auxin concentration on cell elongation

Above certain level (0.9g of auxin per liter of solution, in this case), it usually inhibits cell elongation in stems. This inability effect probably occurs because a high level of IAA makes the plant cells synthesize another hormone, ethylene, which generally counters the effects of IAA. The first (thin) curve on the graph shows the effects of IAA

on root growth. An IAA concentration too low to stimulate shoot cells will cause root cells to elongate. On the other hand, an IAA concentration high enough to make stem cells elongate is in the concentration range that inhibits root cell elongation. These effects of IAA on cell elongation reinforce two points: (1) the same chemical messenger may have different effects at different concentrations in one target cell, and (2) a given concentration of the hormone may have different effects on different target cells.

**Cell Elongation Involving Auxin**

How do auxins make plant cells elongate? One hypothesis is that auxins initiate elongation by weakening cell walls by stimulating certain proteins in a plant cell's plasma membrane to pump hydrogen ions into the cell wall (Figure 3).

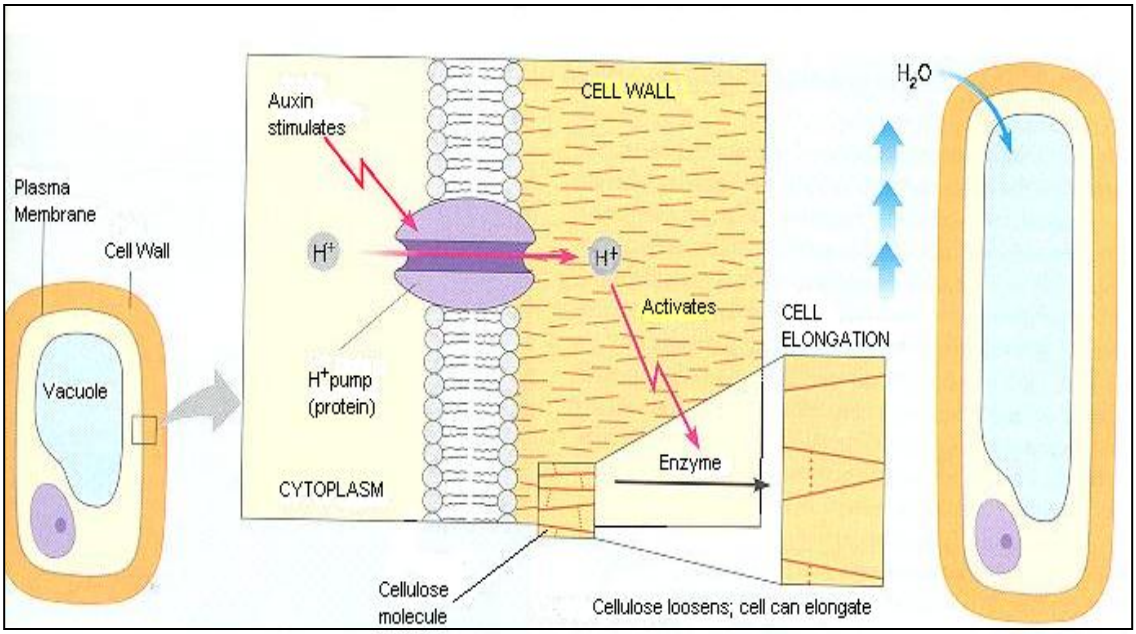


Figure 3 A hypothesis to explain how auxins stimulate cell elongation

The $H^+$ ions activate enzymes that break some of the hydrogen bonds cross-linking cellulose molecules in the wall. The cell then swells with water and elongates because its weakened wall no longer resists the cell's tendency to take up water osmotically. After this initial elongation, the cell sustains the growth by synthesizing more wall material and cytoplasm.

Auxins produce a number of other effects, in addition to stimulating cell elongation and causing stems and roots to lengthen. These hormones can also trigger the development of vascular tissues and induce cell division in the **vascular cambium**, thus promoting growth in stem diameter. Auxins are often used to promote initiation of root growth and are the active ingredient of the commercial preparations used in horticulture to root stem cuttings. They can also be used to promote uniform flowering, to promote fruit development, to inhibit lateral branching and leaf fall, and to prevent premature fruit drop. Some plants will even develop fruits without being fertilized if they are sprayed with auxin. Farmers sometimes produce tomatoes, cucumbers, and eggplants, for example, by spraying the plants with synthetic auxins and resulting in seedless fruits.

END OF TEXT

| No Kad Pengenalan/ *NRIC:* | | | | | | | - | | | - | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|

# TEXT B

## HORMONES AND SIGNAL TRANSDUCTION

Source:
Boyer, R. (2006). *Concepts in Biochemistry* (3rd edition, Wiley Asia Student Edition). Hoboken, NJ: John Wiley & Sons Inc.

**Arahan:**
Sila baca dan **cuba sedaya upaya anda untuk memahami** teks saintifik yang dilampirkan. Selepas anda memahami topik perbincangan itu dan telah bersedia untuk menjawab soalan (dalam bentuk esei dan objektif) berdasarkan teks ini, sila ketepikan teks ini. Anda **TIDAK BOLEH boleh merujuk** kepada teks semasa menjawab soalan-soalan kefahaman. Anda dialu-alukan untuk membuat sebarang tanda, garisan, nota, lukisan dan lain lain catatan untuk membantu kefahaman anda di atas teks ini. Selamat membaca. [Untuk makluman anda ini adalah teks yang terakhir untuk dibaca dalam kajian ini.]

***Instruction:***
*Please read and try your **very best to understand** the content of the scientific text provided. When you have understood the topic and are ready to answer the questions (one short essay and some objective questions) based on the text, please put this text aside. You **CANNOT refer** to the text while answering the comprehension questions. You are welcome to make any markings, underlining, notes, drawing etc on the text as you please. Happy reading. [For you information, this is the last text to be read in this study.]*

## Introduction

Hormones are signaling molecules synthesized and secreted by endocrine glands and transported to their target cells via the bloodstream. These mediators of cell function have a wide range of structures that include amino acid derivatives, small peptides, proteins, and steroids. The rate of glucose metabolism is regulated by peptide products of the pancreas, for example, insulin and glucagons. The development of secondary sex characteristics, on the other hand, is regulated by the steroid hormones such as estrogens and androgens which are produced by the gonads and adrenal cortex.

## Penetrating the Plasma Membrane

It was previously assumed that all hormones interacted directly inside the cell with the proteins, enzymes and nucleic acids whose activities they altered. This is the pathway followed by some nonpolar steroid hormones which are able to diffuse readily through the plasma membrane. Once inside the target cell, the steroid hormones interact with the specific proteins that assist their transport through the nuclear membrane where these hormones usually act. Conversely, other hormones which are relatively polar and/or ionic undergo a signal transduction process to modify activities inside the cell. It is a process by which an extracellular chemical message is transmitted through a cell membrane in order to elicit an intracellular change. Signal transductions often involve the binding of small extracellular signaling molecules to receptors that face outwards from the plasma membrane and trigger events inside the cell. These processes are found in essentially all forms of life and may result in intracellular biochemical or physiological changes involving metabolic regulation, cell development, muscle contraction, or response to environmental stimuli.

## Signal Transduction

The detailed step-by-step process of signal transduction varies greatly from one hormone and organism to another, but a general chain of events involving several common elements has been identified. As the hormone proceeds from its source, via the bloodstream to a target cell, the following chemical reactions take place:

1. The hormone (also called the 'first messenger') binds to a cell surface receptor protein on a target cell. The interaction between the hormone and receptor protein is very specific and shows the characteristics of molecular recognition. The hormone is held in place, reversibly, by noncovalent interactions—hydrogen bonds, van der Waals forces, and hydrophobic interactions. See Figure 1. Most receptor molecules are transmembrane proteins that have three distinct regions: (a) an extracellular region (head) on the outside of the cell where the hormone binds: (b) a region that spans the membrane; and (c) an intracellular region (tail) that extends into cytoplasm of the cell. Thus, the receptor protein physically stretches from the cell's exterior surface to its interior and sets up a communication network between the outside of the cell and its inside.

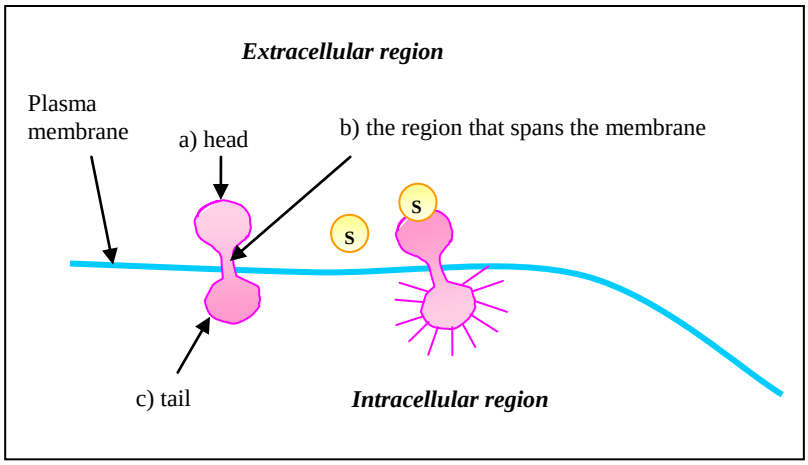


Figure 1: The receptor molecule that is transmembrane. S is a hormone.

2. Extracellular binding of the hormone to the protein receptor site (head) triggers a conformational change that is transmitted to the cytoplasm side of the protein. This action, in turn, relays a biochemical signal to the cell's interior. This biochemical signal may be direct (i.e., activation of an enzyme that catalyzes the formation of a **second messenger**). The second messenger transmits its own biochemical command inside the cell. The events occurring inside the cell are amplified several orders of magnitude by **enzyme cascades**. An enzyme molecule that is activated catalyzes the activation of several molecules of another enzyme that, in turn, activate many molecules of another enzyme, and so on.

3. The transduction process is stopped at the appropriate time with an "off switch" that returns activated proteins and enzymes to their resting states. The off switch is usually an enzyme that chemically modifies an activated protein or one that catalytically destroys a second messenger.

**Types of Receptors**

Receptors are known to be physically connected to elements of the cytoplasm. Scaffolding and anchoring proteins hold groups of receptor proteins together to form networks for accurate transmission of information. Cell surfaces have many different types of receptors, and the scaffolding proteins are thought to organize and enhance the signal transduction process by holding all necessary extracellular and intracellular molecular components together in a single network. Figure 2 illustrates two types of signal transduction processes which are (a) the **receptor enzyme system**, represented by the insulin receptor (tyrosine kinase) and the atrial natriuretic factor (ANF) receptor of kidney (guanylate cyclase); and (b) the **serpentine receptor system**, which works with the G proteins and the most common second messenger, cyclic AMP. The hormones glucagons and epinephrine use this latter system.

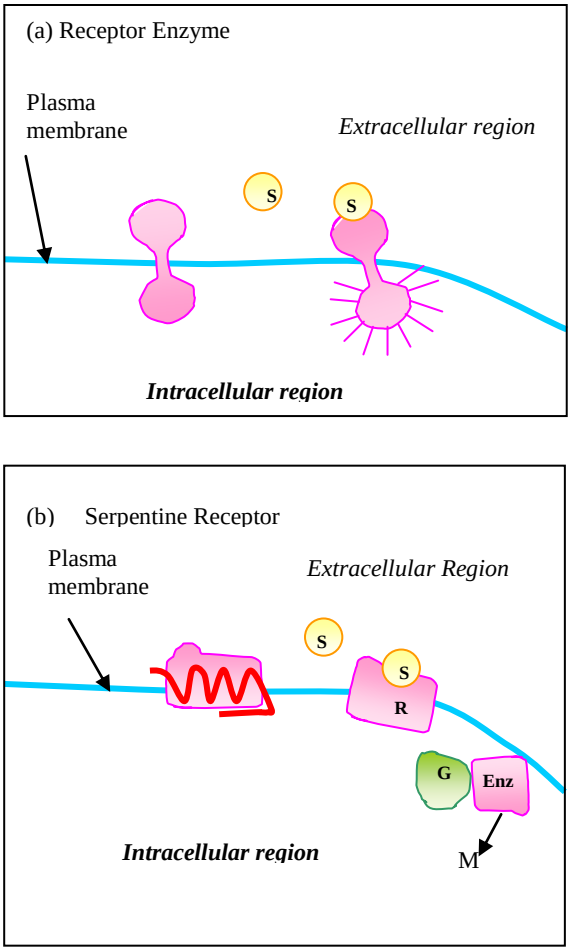


Figure 2 Two types of signal transduction processes

a) **Receptor enzyme**: binding of signal hormone, (**S**), to extracellular domain stimulates enzyme activity in the intracellular domain.

b) **Serpentine receptor**: binding of signal hormone, (**S**), to receptor (**R**) activates an intracellular GTP-binding protein (**G**). This stimulates an enzyme (**Enz**) that produces an intracellular second messenger, **M**.

| No Kad Pengenalan/ *NRIC:* | | | | | | | - | | | - | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|

# READING COMPREHENSION ASSESSMENT

# (RC_WS)

# TEXT A

# AUXINS AND ELONGATION OF CELLS

**Arahan**
Soalan ini memerlukan jawapan dalam bentuk esei pendek. Anda boleh menjawab soalan ini dalam bahasa Melayu, bahasa Inggeris atau bahasa ibunda anda, iaitu yang mana-mana satu mengikut keselesaan anda. Kesilapan ejaan perkataan saintifik tidak akan menjejaskan penilaian. Tuliskan jawapan yang dapat menjawab arahan soalan dan TIDAK LEBIH dari itu. SILA JANGAN MERUJUK KEPADA TEKS.

***Instruction***
*This question requires a short essay answer. You can respond to this question in Malay or English or in your own mother tongue which ever that you feel comfortable with. Mistakes in spelling of scientific terminology will not jeopardize your assessment. Write a respond that could answer the question and NOT MORE than that. PLEASE DO NOT REFER TO THE READING TEXT.*

Write a short composition on the biochemical process of cell elongation.
*Tuliskan satu karangan pendek berkenaan proses 'cell elongation'.*

No Kad Pengenalan/
*NRIC:*

| | | | | | | - | | | - | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|

# READING COMPREHENSION ASSESSMENT

# (RC_WS)

# TEXT B

## Hormones and Signal Transduction

**Arahan**
Soalan ini memerlukan jawapan dalam bentuk esei pendek. Anda boleh menjawab soalan ini dalam bahasa Melayu, bahasa Inggeris atau bahasa ibunda anda, iaitu yang mana-mana satu mengikut keselesaan anda. Kesilapan ejaan perkataan saintifik tidak akan menjejaskan penilaian. Tuliskan jawapan yang dapat menjawab arahan soalan dan TIDAK LEBIH dari itu. SILA JANGAN MERUJUK KEPADA TEKS.

***Instruction***
*This question requires a short essay answer. You can respond to this question in Malay or English or in your own mother tongue which ever that you feel comfortable with. Mistakes in spelling of scientific terminology will not jeopardize your assessment. Write a respond that could answer the question and NOT MORE than that. PLEASE DO NOT REFER TO THE READING TEXT.*

Write a short composition on the biochemical process of signal transduction.
*Tuliskan satu karangan pendek berkenaan proses biokimia 'signal transduction'.*

## Suggested Mark Scheme (WRITTEN SUMMARY)

Written summary of the biochemical process of cell elongation.

1. Full mark is 30.
2. Award marks according to column two.
3. Award marks when idea/meaning comes through.
4. Points/ideas that are underlined should be present in respondent's answer (exact word is not required but meaning must come through).
5. Respondent could write in their mother tongue.
6. No deduction of marks for spelling /punctuation / grammatical errors.
7. Wholesale copying from text, penalize 60% of total marks.
8. Final marks should be scored out of 100%.

Verbal Answer: 25 marks

| **WRITTEN SUMMARY TEXT A** | **WRITTEN SUMMARY TEXT B** |
|---|---|
| *Introductory sentence*<br>Auxins are plant hormone (1m)<br>that<br>promote stem and shoot elongation. (1m) | *Introductory sentence:*<br>Signal transductions often involve the binding of small extracellular signaling molecules (1m)<br>to<br>receptors that face outwards from the plasma membrane (1m)<br>and trigger events inside the cell. (1m) |
| Auxins weaken (1m)<br>the cell walls (1m)<br><br>by stimulating (1m)<br>certain protein (1m) | Molecular recognition of the signaling hormone(1m)<br>by the cell receptor protein enables(1m)<br>the hormone (first messenger) to bind to transmembrane receptor protein (1m)<br>on the surface of a target cell. (1m) |
| in the plasma membrane (1m)<br>of target cells(1m) | The signaling hormone is held in place (1m)<br>by noncovalent interactions. (1m) |
| to pump/release (1m)<br>hydrogen ions(1m)<br>into cell wall. (1m) | The (transmembrane) receptor protein connects cell's exterior (1m)<br>to its interior. (1m) |
| The hydrogen ions (1m)<br>activate the enzymes (1m) | The binding triggers chemical changes(1m)<br>of the hormone on the receptor's head (1m) |

to break hydrogen bonds
cross-linking (1m)
cellulose molecules. (1m)

The weaken cell walls cannot resist(1m)

the cell's tendency to take up water osmotically. (1m)
The cell (1m)
swells with water(1m)

and elongates. (1m)

To sustain growth, (1m)

the wall must synthesize (2m)

more cytoplasm(1m)

and wall materials. (1m)

which (the chemical changes) is transmitted to the cytoplasm. (1m)

This action relays a biochemical signal (1m)

that activates an enzyme(1m)

to catalyze the formation of a second messenger. (1m)

The second messenger transmits its own biochemical command (1m)
inside the cell. (1m)

This event leads to enzyme cascades. (1m)

The transduction process stops (1m)
with an 'off switch', (1m)
usually when an enzyme chemically (1m)modifies the activated enzymes(1m)
or catalytically destroys the second messenger. (1m)

Diagram (5 marks)

| | |
|---|---|
| 5m | The diagram clearly helps to clarify verbal answer (but not copied directly from the text). |
| 4m | The diagram contains helpful items that are being described in the verbal answer. |
| 3m | The diagram contains very few items mentioned in the verbal answer. |
| 2m | The diagram tries to reflect elements of the verbal answer but not very successful. |
| 1m | An attempt to use the diagram to illustrate verbal answer but failed. |
| 0m | No diagram/ wrong diagram/ unrelated diagram. |

No Kad Pengenalan/
*NRIC:*

| | | | | | | - | | | - | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|

# READING COMPREHENSION ASSESSMENT

# (RC_MCQ/TF)

# TEXT A

## Auxins and Elongation of Cells

**Arahan**
Penilaian kefahaman ini mengandungi 2 bahagian. Dalam Bahagian 1, terdapat lima soalan aneka pilihan dan anda dikehendaki memilih jawapan terbaik daripada empat pilihan yang diberi. Bahagian 2, lima soalan Benar/Palsu dan anda dikehendaki menilai setiap pernyataan dan membulatkan (T)-benar atau (F)-palsu pada setiap pilihan yang diberikan. Sila jawab SEMUA soalan tanpa merujuk kepada teks bacaan.

***Instruction***
*This reading comprehension assessment contains 2 parts. In Part 1, there are five multiple choice questions and you are required to choose the best answer from the four alternatives given. In Part 2, there are five clusters of True/False and you are required to evaluate each statement and circle (T)-true or (F)-false on each choice given. Please answer ALL questions without referring back to the reading text.*

**PART 1: MULTIPLE CHOICE QUESTIONS**
**Please choose the BEST answer from the four options given.**

1. Natural auxin is composed of a compound called _____

   A. abscisic acid
   B. indoleacetic acid
   C. amino acid
   D. cytokinin

2. Which parts of the plant BEST describe the locations of an apical meristem?

   A. Seed and root
   B. Stem and shoot
   C. Root and shoot
   D. Leaf stalk and stem

3. Apical dominance means the presence of auxin at high concentration level_____

   A. in the apical bud which inhibits the elongation of the stem.
   B. in the apical bud which promotes the growth of lateral buds.
   C. in the stem which inhibits the development of lateral buds .
   D. in the stem which elongates all buds to receive enough light and nutrients.

4. Which of the statements below is TRUE?

   A. Cutting off the shoot of a rose plant will decrease the auxin level in the stem.
   B. Cutting off the stem of a rose plant will increase the production of ethylene.
   C. Ethylene will be produced in the stem where auxin level is low.
   D. The lateral bud will compete with apical bud for light and nutrient.

5. Which inference about elongation of cells is CORRECT?

   A. The shoot requires much more auxin in order to elongate than the seed.
   B. The bud between the leaf stalk and stem will elongate when auxin level reaches 0.9g/liter.
   C. The stem requires less auxin in order to elongate compared to the shoot.
   D. The root requires much less auxin to elongate compared to the stem.

6. We can infer all the following statements about auxin from the text EXCEPT that

   A. auxin promotes branching
   B. auxin increases the rate of maturation
   C. auxin promotes flowering
   D. auxin reduces loss of leaves

**PART 2: MULTIPLE TRUE AND FALSE**

**Each question below (A - E) is followed by a list of options. Please identify whether each option is TRUE or FALSE by placing a circle around T for TRUE and F for FALSE.**

*Example:*

***'Do you live in Malaysia?'***
***'Yes, _____.'***

| | | | |
|---|---|---|---|
| *1.* | *we do* | *(T)* | *F* |
| *2.* | *they do* | *T* | *(F)* |
| *3.* | *-* | *(T)* | *F* |
| *4.* | *I do* | *(T)* | *F* |
| *5.* | *you do* | *T* | *(F)* |

**A. _____amount of hormone will cause _____ change(s) in plant cell activities.**

| | | | |
|---|---|---|---|
| 7. | A small, great | T | F |
| 8. | A small, small | T | F |
| 9. | A tiny, huge | T | F |
| 10. | A great, no | T | F |
| 11. | Too little, no | T | F |

**B. Auxin…**

| | | | |
|---|---|---|---|
| 12. | produced at the tip of a root will move downward to stimulate cell growth. | T | F |
| 13. | produced at the tip of a shoot will move upward to stimulate cell growth. | T | F |
| 14. | produced in the vascular cambium will cause the stem to grow in diameter. | T | F |
| 15. | in the seed will cause the fruit to grow bigger. | T | F |
| 16. | always moves away from the tip to cause elongation in cells. | T | F |
| 17. | has little effect on tissues and cells in the vascular cambium. | T | F |

**C. When auxin level is higher than 0.9g/liter, _____**

| | | | |
|---|---|---|---|
| 18. | the root cells will elongate. | T | F |
| 19. | the plant will produce the hormone ethylene | T | F |
| 20. | the shoot cell will elongate | T | F |
| 21. | the stem cell will elongate | T | F |
| 22. | elongation of plant cells will slow down | T | F |
| 23. | auxin treatment will have no effect on the plant cells | T | F |
| 24. | the rate of cell elongation will drop | T | F |

**D. What do you understand about the effects of plant hormones on cell elongation as mentioned in the text?**

| | | | |
|---|---|---|---|
| 25. | Different chemical hormones will have different effects on cell elongations of plants. | T | F |
| 26. | At a certain concentration level, IAA hormone will have different effects on one target cell. | T | F |
| 27. | At a certain concentration level, IAA hormone will have similar effects on different target cells. | T | F |
| 28. | At different concentration levels, the same hormone will have different effects on same target cells. | T | F |
| 29. | At a certain concentration level of IAA hormone, a different hormone will be synthesized to enhance the elongation of the same target cells. | T | F |
| 30. | Root cells require IAA hormone at a higher level than do stem cells to elongate. | T | F |

**E. We can infer from the passage that the possible reason(s) farmers use auxin on their farms is/ are to …..**

| | | | |
|---|---|---|---|
| 31. | control inactive trees from producing fruits. | T | F |
| 32. | shorten farming time. | T | F |
| 33. | produce bigger fruits. | T | F |
| 34. | produce fruits out of season. | T | F |
| 35. | increase the quality of farm produce. | T | F |
| 36. | enhance premature fruit drop | T | F |

No Kad Pengenalan/
*NRIC:*

| | | | | | | - | | | - | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|

# READING COMPREHENSION ASSESSMENT

# (RC_MCQ/TF)

# TEXT B

## Hormone and Signal Transduction

**Arahan**
Penilaian kefahaman ini mengandungi 2 bahagian. Dalam Bahagian 1, terdapat lima soalan aneka pilihan dan anda dikehendaki memilih jawapan terbaik daripada empat pilihan yang diberi. Bahagian 2, lima soalan Benar/Palsu dan anda dikehendaki menilai setiap pernyataan dan membulatkan (T)-benar atau (F)-palsu pada setiap pilihan yang diberikan. Sila jawab SEMUA soalan tanpa merujuk kepada teks bacaan.

***Instruction***
*This reading comprehension assessment contains 2 parts. In Part 1, there are five multiple choice questions and you are required to choose the best answer from the four alternatives given. In Part 2, there are five clusters of True/False and you are required to evaluate each statement and circle (T)-true or (F)-false on each choice given. Please answer ALL questions without referring back to the reading text.*

**PART 1: MULTIPLE CHOICE QUESTIONS**
**Please choose the BEST answer from the four options given.**

37. Hormones are synthesized, secreted, and transported through the bloodstream to_____

    A. regulate the rate of glucose metabolism.
    B. develop secondary sex characteristics.
    C. alter chemical reactions inside the cell.
    D. stimulate cell growth and activities.

38. Hormones come in a wide range of structures such as those below EXCEPT

    A. lipid
    B. amino acid
    C. peptides
    D. protein

39. In order to get across the plasma membrane, nonpolar hormones MUST_____

    A. send chemical signals through a receptor
    B. modify the cells of the plasma membrane
    C. interact with specific proteins
    D. dissolve into the plasma membrane

40. Which one below is the general characteristic of hormones? They _____

    A. fuse with proteins inside the cell.
    B. send signals via a transmembrane receptor.
    C. exist in the form of steroids.
    D. are water-soluble.

41. Which of the statements on hormone receptors below is FALSE?

    A. The cell surfaces are equipped with many different types of receptor enzymes to conduct signal transduction process.
    B. Hormone receptors are physically connected to the cytoplasm in the cells.
    C. Receptor enzyme system activates enzyme activities in the extracellular region.
    D. Serpentine receptor activates a GTP binding-protein that stimulates a second messenger.

**PART 2: MULTIPLE TRUE AND FALSE**

**Each question below (A - E) is followed by a list of options. Please identify whether each option is TRUE or FALSE by placing a circle around T for TRUE and F for FALSE.**

*Example:*

***'Do you live in Malaysia?'***
***'Yes, _____.'***

| | | | |
|---|---|---|---|
| *1.* | *we do* | *(T)* | *F* |
| *2.* | *they do* | *T* | *(F)* |
| *3.* | *-* | *(T)* | *F* |
| *4.* | *I do* | *(T)* | *F* |
| *5.* | *you do* | *T* | *(F)* |

**F. To cause changes in target cells, polar hormones _____**

| | | | |
|---|---|---|---|
| 42. | send extracellular chemical message through the plasma membrane | T | F |
| 43. | modify extracellular receptor outside the plasma membrane | T | F |
| 44. | bind with external receptors and set up communication networks with intracellular cells | T | F |
| 45. | convey chemical message through extracellular receptor outside the plasma membrane | T | F |
| 46. | send intracellular chemical message through the plasma membrane | T | F |

**G. The characteristic(s) of a transmembrane receptor is/ are as follows:**

| | | | |
|---|---|---|---|
| 47. | It spans the thickness of the plasma membrane. | T | F |
| 48. | It has a head that lies in the cytoplasm. | T | F |
| 49. | Its tail lies in the interior of the plasma membrane. | T | F |
| 50. | It allows hormones to pass through the plasma membrane. | T | F |
| 51. | It recognizes steroid and allows it to pass through to the cells. | T | F |
| 52. | It sends a biochemical signal from the hormone to the intracellular cell. | T | F |
| 53. | It changes biochemical signal sent by the hormone to the intracellular cell. | T | F |

**H. The process of signal transduction is as follows:**

54. The hormone binds to the cell surface receptor which is called the first messenger. T F
55. The cell surface receptor carries the hormone across the plasma membrane. T F
56. Recognition of the hormone molecules by the cell surface receptor will lead to the chemical interaction of both. T F
57. The hormone and receptor are held together by noncovalent interactions. T F
58. Intracellular signal transduction is largely carried out by the first messenger molecules. T F

**I. Signal transduction is a process_____**

59. whereby a cell membrane becomes a mediator between extracellular signaling molecules and intracellular chemical exchanges inside the plasma membrane. T F
60. that involves the binding of hormone molecules on the surface of the plasma membrane which causes chemical changes inside the cytoplasm. T F
61. of modifying cell activities outside the plasma membrane through internal chemical stimulation in the cytoplasm. T F
62. whereby a polar hormone diffuses itself through the plasma membrane to elicit chemical changes inside the cell. T F
63. by which a cell converts one kind of stimulus into another, most often involving ordered sequences of biochemcial reactions inside the cell. T F
64. involving the binding of extracellular signaling molecules to receptors that face outwards from the membrane and trigger events inside the cells. T F

**J. Identify true and false statements about <u>enzyme cascades.</u>**

65. They usually amplify the signal from a few molecules to a large cellular response. T F
66. Activated enzyme molecules trigger activations of several molecules of other enzymes and in turn activate many other molecules of other enzymes. T F
67. The binding of one or a few hormone molecules will induce a small enzymatic reaction that affects a few other enzymes. T F
68. Enzyme cascades end when the activated proteins are removed from the cell and thus stop the signal transduction process. T F
69. The second messenger inside the cell must be destroyed in order to stop the enzyme cascades. T F

| No Kad Pengenalan/ *NRIC:* | | | | | | | - | | | - | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|

# INVENTORI KESEDARAN METAKOGNISI

*METACOGNITIVE AWARENESS INVENTORY*

# MAI

**Arahan**

Sila nyatakan sejauh mana benar atau tidak setiap pernyataan yang berikut dengan diri anda, kemudian bulatkan nombor yang sepadan dengan diri anda berdasarkan skala yang disediakan. Contohnya, jika pernyataan tersebut sangat benar tentang diri anda, bulatkan nombor 7.

***Instruction***

*Please indicate to what extent each of the statements below applies to you using the scale provided below. For example, if the statement is very true about yourself, circle number 7.*

| 1 2 | 3 4 5 | 6 7 |
|---|---|---|
| **Langsung tidak benar tentang diri saya** *Not true at all about myself* | **Sederhana benar tentang diri saya** *Somewhat true about myself* | **Sangat benar tentang diri saya** *Very true about myself* |

| | | |
|---|---|---|
| 1. | Saya bertanya diri saya secara berkala sama ada saya mencapai matlamat saya atau tidak.<br><br>I ask myself periodically if I am meeting my goals. | 1 2 3 4 5 6 7 |
| 2. | Saya mempertimbangkan beberapa alternatif bagi sesuatu masalah sebelum menjawabnya<br><br>I consider several alternatives to a problem before I answer. | 1 2 3 4 5 6 7 |
| 3. | Saya cuba menggunakan strategi yang telah berjaya pada masa lepas.<br><br>I try to use strategies that have worked in the past. | 1 2 3 4 5 6 7 |
| 4. | Saya membahagikan waktu untuk belajar dan membuat tugasan dengan seimbang supaya saya mempunyai masa yang cukup.<br><br>I pace myself while learning in order to have enough time. | 1 2 3 4 5 6 7 |
| 5. | Saya tahu kekuatan dan kelemahan intelektual saya.<br><br>I understand my intellectual strengths and weaknesses. | 1 2 3 4 5 6 7 |
| 6. | Saya memikirkan perkara yang perlu saya pelajari sebelum memulakan sesuatu tugasan.<br><br>I think about what I really need to learn before I begin a task. | 1 2 3 4 5 6 7 |
| 7. | Saya tahu sejauh mana pencapaian saya setelah selesai mengikuti sesuatu ujian.<br><br>I know how well I did once I finish a test. | 1 2 3 4 5 6 7 |
| 8. | Saya menetapkan matlamat tertentu sebelum memulakan sesuatu tugasan.<br><br>I set specific goals before I begin a task. | 1 2 3 4 5 6 7 |
| 9. | Saya memperlahankan bacaan apabila saya menemui sesuatu maklumat penting.<br><br>I slow down when I encounter important information. | 1 2 3 4 5 6 7 |

| | | |
|---|---|---|
| **1 2** | **3 4 5** | **6 7** |
| **Langsung tidak benar tentang diri saya** | **Sederhana benar tentang diri saya** | **Sangat benar tentang diri saya** |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 10. | Saya tahu maklumat mana yang penting untuk dipelajari.<br><br>I know what kind of information is most important to learn. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 11. | Saya tanya diri saya sama ada saya telah mempertimbangkan semua pilihan ketika menyelesaikan masalah.<br><br>I ask myself if I have considered all options when solving a problem. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 12. | Saya boleh menyusun maklumat dengan baik.<br><br>I am good at organizing information. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 13. | Secara sedar saya menumpukan perhatian saya kepada maklumat yang penting.<br><br>I consciously focus my attention on important information. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 14. | Saya mempunyai tujuan yang khusus bagi setiap strategi yang saya gunakan.<br><br>I have a specific purpose for each strategy I use. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 15. | Saya dapat mempelajari sesuatu dengan baik apabila saya tahu sesuatu tentang tajuk yang berkenaan.<br><br>I learn best when I know something about the topic. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 16. | Saya tahu apa yang pensyarah harapkan saya belajar.<br><br>I know what the teacher expects me to learn. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 17. | Saya dapat mengingati maklumat dengan baik.<br><br>I am good at remembering information. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 18. | Saya menggunakan strategi belajar yang berbeza berdasarkan situasi.<br><br>I use different learning strategies depending on the situation. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |

| | | |
|---|---|---|
| **1 2** | **3 4 5** | **6 7** |
| **Langsung tidak benar tentang diri saya** | **Sederhana benar tentang diri saya** | **Sangat benar tentang diri saya** |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 19. | Selepas saya menyelesaikan tugasan, saya bertanya kepada diri sendiri sama ada terdapat cara yang lebih mudah untuk melakukannya atau tidak.<br><br>I ask myself if there was an easier way to do things after I finish a task. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 20. | Saya boleh mengawal sama ada saya telah belajar dengan baik atau tidak.<br><br>I have control over how well I learn. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 21. | Saya membuat prebiu atau mengimbas kembali secara berkala untuk membantu saya memahami perkaitan-perkaitan yang penting tentang perkara yang saya pelajari.<br><br>I periodically review to help me understand important relationships. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 22. | Saya mengemukakan soalan-soalan kepada diri sendiri tentang bahan (yang akan dipelajari) sebelum saya bermula.<br><br>I ask myself questions about the material before I begin. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 23. | Saya memikirkan beberapa cara untuk menyelesaikan masalah dan memilih yang terbaik.<br><br>I think of several ways to solve a problem and choose the best one. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 24. | Setelah habis belajar, saya selalu merumuskan perkara yang telah saya pelajari.<br><br>I summarize what I've learned after I finish. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 25. | Saya bertanya kepada orang lain untuk membantu saya apabila saya tidak memahami sesuatu.<br><br>I ask others for help when I don't understand something. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 26. | Saya boleh memotivasikan diri saya untuk belajar jika perlu.<br><br>I can motivate myself to learn when I need to. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 27. | Saya sedar tentang strategi yang saya gunakan ketika saya belajar.<br><br>I am aware of what strategies I use when I study. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 28. | Saya dapati saya menganalisa keberkesanan strategi yang saya gunakan ketika saya belajar.<br><br>I find myself analyzing the usefulness of strategies while I study. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 29. | Saya menggunakan kekuatan intelek saya untuk mengimbangi kelemahan saya.<br><br>I use my intellectual strengths to compensate for my weaknesses. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 30. | Saya memfokuskan kepada makna dan kepentingan sesuatu maklumat baru.<br><br>I focus on the meaning and significance of new information. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 31. | Saya mencipta contoh saya sendiri bagi menjadikan sesuatu maklumat itu lebih bermakna.<br><br>I create my own examples to make information more meaningful. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 32. | Saya boleh menilai sama ada saya telah memahami sesuatu dengan baik atau tidak.<br><br>I am a good judge of how well I understand something. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 33. | Saya dapati saya menggunakan strategi yang berguna secara automatik.<br><br>I find myself using helpful learning strategies automatically. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 34. | Saya dapati saya selalu berhenti sejenak untuk menyemak kefahaman saya.<br><br>I find myself pausing regularly to check my comprehension. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 35. | Saya tahu bila setiap strategi yang saya gunakan itu akan menjadi sangat berkesan.<br><br>I know when each strategy I use will be most effective. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |

| | | |
|---|---|---|
| 36. | Setelah selesai, saya bertanya diri sendiri tentang sejauh mana saya mencapai matlamat saya.<br><br>I ask myself how well I accomplish my goals once I'm finished. | 1 2 3 4 5 6 7 |
| 37. | Saya melukis gambar atau rajah untuk membantu saya memahami perkara yang saya pelajari.<br><br>I draw pictures or diagrams to help me understand while learning. | 1 2 3 4 5 6 7 |
| 38. | Setelah saya menyelesaikan sesuatu masalah, saya bertanya diri sendiri sama ada saya telah mempertimbangkan semua pilihan atau tidak.<br><br>I ask myself if I have considered all options after I solve a problem. | 1 2 3 4 5 6 7 |
| 39. | Saya cuba menterjemahkan maklumat baru dengan menggunakan perkataan saya sendiri.<br><br>I try to translate new information into my own words. | 1 2 3 4 5 6 7 |
| 40. | Saya mengubah strategi apabila saya gagal memahami sesuatu perkara.<br><br>I change strategies when I fail to understand. | 1 2 3 4 5 6 7 |
| 41. | Saya menggunakan struktur organisasi teks untuk membantu saya belajar.<br><br>I use the organizational structure of the text to help me learn. | 1 2 3 4 5 6 7 |
| 42. | Saya membaca arahan dengan berhati-hati sebelum saya memulakan tugasan.<br><br>I read instructions carefully before I begin a task. | 1 2 3 4 5 6 7 |
| 43. | Saya bertanya diri sendiri sama ada perkara yang saya baca berkaitan dengan perkara yang saya telah ketahui.<br><br>I ask myself if what I'm reading is related to what I already know. | 1 2 3 4 5 6 7 |
| 44. | Saya menilai andaian saya semula apabila saya keliru.<br><br>I reevaluate my assumptions when I get confused. | 1 2 3 4 5 6 7 |

| | | |
|---|---|---|
| **1 2** | **3 4 5** | **6 7** |
| **Langsung tidak benar tentang diri saya** | **Sederhana benar tentang diri saya** | **Sangat benar tentang diri saya** |

| | | |
|---|---|---|
| 45. | Saya mengatur masa saya sebaik mungkin untuk mencapai matlamat saya.<br><br>I organize my time to best accomplish my goals. | 1 2 3 4 5 6 7 |
| 46. | Saya belajar lebih apabila saya meminati sesuatu topik.<br><br>I learn more when I am interested in the topic. | 1 2 3 4 5 6 7 |
| 47. | Saya mencuba untuk membahagi-bahagikan pembelajaran saya kepada langkah-langkah kecil.<br><br>I try to break studying down into smaller steps. | 1 2 3 4 5 6 7 |
| 48. | Saya memfokuskan makna keseluruhan berbanding dengan perkara-perkara perincian.<br><br>I focus on overall meaning rather than specifics. | 1 2 3 4 5 6 7 |
| 49. | Saya mengemukakan soalan kepada diri sendiri tentang sejauh mana pemahaman saya ketika saya mempelajari sesuatu yang baru.<br><br>I ask myself questions about how well I am doing while I am learning something new. | 1 2 3 4 5 6 7 |
| 50. | Saya bertanya diri sendiri sama ada saya telah belajar seberapa banyak yang mungkin atau tidak sebaik saya menyelesaikan sesuatu tugasan.<br><br>I ask myself if I learned as much as I could have once I finish a task. | 1 2 3 4 5 6 7 |
| 51. | Saya berhenti dan berpatah semula kepada maklumat baru yang tidak jelas.<br><br>I stop and go back over new information that is not clear. | 1 2 3 4 5 6 7 |
| 52. | Saya berhenti dan membaca semula apabila saya menjadi keliru.<br><br>I stop and reread when I get confused. | 1 2 3 4 5 6 7 |

**TERIMA KASIH**

***THANK YOU***

| | | |
|---|---|---|
| **1 2** | **3 4 5** | **6 7** |
| **Langsung tidak benar tentang diri saya** | **Sederhana benar tentang diri saya** | **Sangat benar tentang diri saya** |

| I/C No/ *No. Kad Pengenalan:* | | | | | | | - | | | - | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|

# INVENTORI PENGETAHUAN SAINTIFIK SEDIA ADA

*SCIENTIFIC PRIOR KNOWLEDGE INVENTORY*

**Arahan**
Terdapat **80 pernyataan** di bawah. Berikan respon anda terhadap setiap pernyataan. Sila kenalpasti setiap pernyataan di bawah sebagai **BENAR** atau **PALSU**. Jika pernyataan tersebut adalah **Benar**, bulatkan **T**. Walau bagaimanapun, jika pernyataan tersebut adalah **Palsu**, bulatkan **F** dan sila tulis pernyataan atau jawapan yang betul di ruang yang disediakan. Ejaan yang tepat untuk istilah saintifik tidak diwajibkan, oleh yang demikian, tuliskan ejaan yang anda rasakan betul. Markah tidak akan ditolak untuk kesilapan ejaan. Jika anda tidak tahu atau tidak pasti tentang pernyataan-pernyataan yang diberi, **JANGAN BUAT TEKAAN RAMBANG**, tetapi bulatkan **DK** untuk **TIDAK TAHU**.

***Instruction***
*There are **80 statements** below. Please respond to all of them. Determine whether each of the statements is **TRUE (T)** or **FALSE (F)**. If the statement is **True** circle **T**. On the other hand, if it is **False**, circle **F** and please write the correct statement/ answer in the blank provided. Correct spelling of scientific terms is not mandatory, so spell the words the best you can. Marks will not be deducted for mistakes in spelling. If you do not know about or are not sure of the statements, **DO NOT MAKE BLIND GUESSES**, but circle **DK** for **DON'T KNOW**.*

## ASSESSMENT ON FIRST YEAR SCIENCE STUDENT'S PRIOR KNOWLEDGE ON TOPICS IN BIOLOGY

| | | | | | |
|---|---|---|---|---|---|
| 1. | There are three major types of plant hormones; auxins, cytokinins, and ethylene. | T | F | _____ | DK |
| 2. | Plant hormones generally control plant growth and development by affecting division and elongation, and differentiation of cells. | T | F | _____ | DK |
| 3. | Each plant hormone functions in isolation/ works on its own to affect cell development. | T | F | _____ | DK |
| 4. | Most plant hormones are required to be at high concentrations to function. | T | F | _____ | DK |
| 5. | Auxin is found in only natural form. | T | F | _____ | DK |
| 6. | Auxin is produced from the amino acid tryptophan at the shoot tips on plants. | T | F | _____ | DK |
| 7. | The apical meristem is located at the stem of a plant. | T | F | _____ | DK |
| 8. | Only the apical meristem of a plant synthesizes the hormone auxin for cell growth. | T | F | _____ | DK |
| 9. | Apical dominance is the plant way of ensuring that lateral buds get sufficient amount of auxin to elongate. | T | F | _____ | DK |
| 10. | Auxin only moves from the tip of a shoot to the base and not vice versa. | T | F | _____ | DK |
| 11. | This downward movement of auxin as stated above (no. 8) is due to the pull of gravity. | T | F | _____ | DK |
| 12. | A higher concentration level of auxin promotes the production of cytokinins in plants. | T | F | _____ | DK |
| 13. | Seeds do not synthesize auxin but depend on auxin produced by other parts of the plants for the growth of fruit. | T | F | _____ | DK |
| 14. | When the shoot of a plant is cut off, the auxin level in the stem will increase. | T | F | _____ | DK |
| 15. | The root of a plant does not require auxin to elongate. | T | F | _____ | DK |
| 16. | The use of auxin promotes branching of trees. | T | F | _____ | DK |
| 17. | Auxin induces cell division in the vascular cambium. | T | F | _____ | DK |
| 18. | Auxin does not affect phototropism and geotropism in plants. | T | F | _____ | DK |
| 19. | Auxin stimulates the development of fruit. | T | F | _____ | DK |
| 20. | Auxin stimulates cell growth only over a certain concentration range, from about $10^{-8}$ to $10^{-4}$ *M*. | T | F | _____ | DK |
| 21. | At higher concentrations, auxins may inhibit cell elongation. | T | F | _____ | DK |
| 22. | Auxin also inhibits the elongation of root cells. | | | | |
| 23. | Synthetics auxins are also used as herbicides to kill all weeds. | T | F | _____ | DK |
| 24. | Synthetic auxins sprayed on fruit trees yield seedless fruits. | T | F | _____ | DK |

25. Use of auxin on plants will increase the amount of leave drops T F _____ DK

*Statements in **No. 26 – 35** are connected to each other and describe the step-by-step of a biochemical process of cell elongation in plants. Again, identify statements which are T, F or DK accordingly.*

26. Unidirectional light will cause auxin to move toward the illuminated side of the plant. T F _____ DK
27. Auxin stimulates the elongation of cells on the illuminated side. T F _____ DK
28. Auxin moves to the apex from the area where cell elongation will take place. T F _____ DK
29. The proton pumps located in the plasma membrane are the key component in the growth response of the cells. T F _____ DK
30. Auxin stimulates the special proton pumps in the plasma membrane of target cells to release protein into the cell wall. T F _____ DK
31. This action increases the pH in the cell wall. T F _____ DK
32. Enzymes that are pH-dependent then break down important structural bonds between cellulose molecules. T F _____ DK
33. The cellulose molecules are loosened by the increase in alkali of the cell wall. T F _____ DK
34. Once the wall is weakened, the cells take up more water through osmosis. T F _____ DK
35. The cells elongate as the plant continues to synthesize more wall materials and cytoplasm. T F _____ DK
36. Plasma membrane is jelly-like cell substance which is found inside the cell membrane. T F _____ DK
37. Enzymes are proteins that determine chemical reactions in the cells. T F _____ DK
38. The vascular cambium functions like the apical meristem in a plant. T F _____ DK
39. Water flows osmotically from the solution with high solute concentration into the solution with lower solute concentration. T F _____ DK
40. Abscisic Acid (ABA) inhibits cell division in vascular cambium T F _____ DK
41. Van der Waals force is strong attractive force between molecules T F _____ DK
42. Hydrogen bond is weaker than Van der Waals forces than covalent or ionic bonds. T F _____ DK
43. Hydrophobic characterizes a substance that is polar and water soluble. T F _____ DK
44. Vascular tissue is blood carrying tissue. T F _____ DK
45. The cytoplasm is a thin molecular layer that surrounds all living cells. T F _____ DK
46. Transmembrane receptor is fatty acid spans the vacuole with one part of the receptor on the outside of the cell and the other on the inside of the cell. T F _____ DK
47. Enzyme cascades originate from a large stimulus but T F _____ DK

result in a small response of biochemical reactions inside a cell.

48. Second messenger molecules are located outside the plasma membrane and stimulated by the first messenger molecules inside the cell. T F _____ DK
49. Hydrophilic characterizes a substance that dissolves in water. T F _____ DK
50. The human endocrine system consists of the pituitary gland, the thyroid gland, the ovaries and the testes. T F _____ DK
51. The endocrine glands produce and release hormones directly into the bloodstream. T F _____ DK
52. Hormones travel far into the body system to regulate the activities of certain target cells in tissues and organs. T F _____ DK
53. Natural human hormones are made up of a lipid called cholesterol. T F _____ DK
54. Hormones can affect among others blood sugar balance, metabolic regulation, cell development, and muscle contraction. T F _____ DK
55. The function of hormone is to stimulate cell growth and activities T F _____ DK
56. Hormones generally have short lifetime. T F _____ DK
57. Glucagon is secreted by the pituitary gland. T F _____ DK
58. Insulin stimulates the breakdown of glycogen to glucose. T F _____ DK
59. Estrogens and androgens are produced by the gonads and adrenal cortex. T F _____ DK
60. Most hormones are hydrophobic. T F _____ DK
61. Steroid hormones are hydrophobic, so they are carried in the bloodstream by carrier proteins. T F _____ DK
62. Hormones generally have a short lifetime. T F _____ DK
63. Certain hormones with polar chemical nature are able to diffuse readily through the plasma membrane. T F _____ DK
64. All hormones work directly on the cells inside the plasma membrane by activating with the proteins, enzymes and nucleic acids. T F _____ DK
65. Non polar hormones must send chemical signals through a receptor to penetrate through the plasma membrane T F _____ DK
66. All hormones will have to interact with amino acids once inside the plasma membrane. T F _____ DK
67. Receptor enzyme system activates enzyme activities in the extracellular region. T F _____ DK
68. Transmembrane receptor allows polar hormone to pass through the plasma membrane into the cell interior. T F _____ DK

*Statements in **No. 69 – 80** are connected to each other and describe the step-by-step a biochemical process of signal transduction. Again, identify statements which are T, F or DK accordingly.*

69. Signal transduction usually involves the binding of T F _____ DK

| | | | | | |
|---|---|---|---|---|---|
| | signaling molecules to hormone receptors that are on the inside of the plasma membrane which activates activities outside the membrane. | | | | |
| 70. | Hormone receptors are cell-surface (plasma membrane) receptors. | T | F | _____ | DK |
| 71. | The binding of just one or a few hormone molecules on hormone receptors cannot induce an enzymatic reaction or alter intracellular activities. | T | F | _____ | DK |
| 72. | The hormone and receptor are held together by covalent interactions. | T | F | _____ | DK |
| 73. | Hormone receptors that have been activated by signaling hormones can activate many downstream effector proteins which in turn lead to enzyme cascades. | T | F | _____ | DK |
| 74. | Responses stimulated by signaling hormones on the activities of existing enzymes are slow-moving. | T | F | _____ | DK |
| 75. | Most common enzyme-linked receptors are receptor tyrosine kinesis. | T | F | _____ | DK |
| 76. | When hormones bind on a receptor protein on the outside of the cell, the receptor changes in shape and activates a G protein on the inside of the cell. | T | F | _____ | DK |
| 77. | The changes in the receptor cause the G protein to release GTP. | T | F | _____ | DK |
| 78. | G proteins activate specific target enzymes that produce many additional small signaling molecules called second messengers. | T | F | _____ | DK |
| 79. | Second messengers can activate broad and diverse target proteins in the cell in the process of stimulating the response to the signaling hormone. | T | F | _____ | DK |
| 80. | Intracellular signal transduction is largely carried out by first messenger molecules. | T | F | _____ | DK |

**THANK YOU FOR YOUR KIND COOPERATION**

***TERIMA KASIH DI ATAS KERJASAMA ANDA***

| No Kad Pengenalan/ *NRIC:* | | | | | | | - | | | - | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|

# INVENTORI STRATEGI MEMBACA BAHAN AKADEMIK TEKS SAINTIFIK

## *SCIENTIFIC TEXT ACADEMIC READING STRATEGY INVENTORY*

# *STARS Inventory*

**Arahan**

Sila nyatakan sejauh mana benar atau tidak setiap pernyataan berikut dengan diri anda, kemudian bulatkan nombor yang sepadan dengan diri anda berdasarkan skala yang disediakan di bawah. Contohnya, jika pernyataan tersebut sangat benar tentang cara anda membaca teks saintifik sebentar tadi, bulatkan nombor 7.

***Instruction***

*Please indicate to what extent each of the statements below applies to you using the scale provided below. For example, if the statement is very true about how you read the scientific text just now, circle number 7.*

| 1 2 | 3 4 5 | 6 7 |
|---|---|---|
| **Langsung tidak benar tentang cara saya membaca tadi** | **Sederhana benar tentang cara saya membaca tadi** | **Sangat benar tentang cara saya membaca tadi** |
| *Not true at all about how I read just now* | *Somewhat true about how I readjust now* | *Very true about how I read just now* |

| | | |
|---|---|---|
| 1. | Sebelum membaca, saya cuba meramal kandungan teks dengan melihat tajuk dan gambar rajahnya.<br><br>Before reading, I tried to predict the contents of the text by looking at the title and the visual diagrams. | 1 2 3 4 5 6 7 |
| 2. | Saya bertanya kepada diri sendiri maksud rangkai kata / ayat yang tidak saya fahami.<br><br>I asked myself meanings of phrases/ sentences that I did not understand. | 1 2 3 4 5 6 7 |
| 3. | Selepas membaca beberapa ayat, saya bertanya kepada diri sendiri sama ada saya memahami isi-isi yang disampaikan di dalam teks atau tidak.<br><br>After reading every few sentences, I asked myself if I understood the points conveyed in the text. | 1 2 3 4 5 6 7 |
| 4. | Semasa saya melihat gambar rajah, saya menyoal fungsi setiap item yang dilabelkan.<br><br>As I looked at the diagram, I questioned the function of each labeled item. | 1 2 3 4 5 6 7 |
| 5. | Saya mengungkap kembali maklumat di dalam teks dengan menggunakan perkataan saya sendiri dan memberi contoh-contoh yang bermakna untuk menambahkan pemahaman saya tentang isi kandungan teks.<br><br>I paraphrased the information in the text in my own words and added meaningful examples to enhance my comprehension of the content. | 1 2 3 4 5 6 7 |
| 6. | Saya meneka maksud perkataan dan rangkai kata yang tidak diketahui.<br><br>I guessed the meaning of unknown words or phrases. | 1 2 3 4 5 6 7 |
| 7. | Saya meneka kandungan teks semasa saya sedang membaca.<br><br>I guessed what the material was about as I was reading. | 1 2 3 4 5 6 7 |
| 8. | Saya menterjemah perkataan-perkataan bahasa Inggeris ke dalam bahasa ibunda saya.<br><br>I translated the English words into my native language. | 1 2 3 4 5 6 7 |

| | | |
|---|---|---|
| **1 2**<br>**Langsung tidak benar tentang cara saya membaca tadi** | **3 4 5**<br>**Sederhana benar tentang cara saya membaca tadi** | **6 7**<br>**Sangat benar tentang cara saya membaca tadi** |

| | | |
|---|---|---|
| 9. | Saya kembangkan maklumat dalam teks dengan mengaitkannya dengan pengalaman saya sendiri supaya saya dapat memahami kandungan teks tersebut dengan lebih baik.<br><br>I expended the information in the text by associating it to my own personal experience so that I could understand the content of the text better. | 1 2 3 4 5 6 7 |
| 10. | Saya melukis peta minda di atas kertas untuk mendapat pemahaman yang menyeluruh mengenai teks.<br><br>I drew mind map on paper to get the overall understanding of the text. | 1 2 3 4 5 6 7 |
| 11. | Saya melihat dengan teliti gambar rajah yang diberi semasa saya membaca penerangan mengenainya di dalam teks.<br><br>I studied the diagram provided as I read the description on it in the text. | 1 2 3 4 5 6 7 |
| 12. | Saya menyemak sama ada tekaan-tekaan saya mengenai maklumat di dalam teks benar atau salah.<br><br>I checked to see if my guesses about the information in text were right or wrong. | 1 2 3 4 5 6 7 |
| 13. | Saya membaca semula ayat dan perenggan-perenggan sebelumnya untuk menyemak pemahaman saya apabila terdapat percanggahan maklumat.<br><br>I reread previous sentences and paragraphs to check my understanding when I came across conflicting information. | 1 2 3 4 5 6 7 |
| 14. | Semasa membaca tadi, saya memutuskan tentang perkara yang perlu dibaca dengan teliti dan perkara yang perlu diabaikan.<br><br>While reading just now, I decided what to read closely and what to ignore. | 1 2 3 4 5 6 7 |
| 15. | Saya bulatkan perkataan yang tidak saya fahami.<br><br>I circled words that I did not understand. | 1 2 3 4 5 6 7 |
| 16. | Saya menyemak ketepatan ramalan saya mengenai kandungan teks semasa membaca.<br><br>I checked my predictions about the content of the text while reading. | 1 2 3 4 5 6 7 |

| 1 2 | 3 4 5 | 6 7 |
|---|---|---|
| **Langsung tidak benar tentang cara saya membaca tadi** | **Sederhana benar tentang cara saya membaca tadi** | **Sangat benar tentang cara saya membaca tadi** |

| | | |
|---|---|---|
| 17. | Semasa saya membaca teks sebentar tadi, saya sentiasa bertanya soalan mengenai isi-isi dan maklumat yang dibincangkan di dalam teks.<br><br>As I read the text just now, I kept on asking questions about the points and information discussed in the text. | 1 2 3 4 5 6 7 |
| 18. | Saya membuat ringkasan secara lisan tentang perkara yang saya baca untuk menggabungkan kesemua maklumat di dalam teks tersebut.<br><br>I verbally summarized what I read to synthesize all the information in the text. | 1 2 3 4 5 6 7 |
| 19. | Saya membuat kesimpulan sendiri mengenai isi-isi yang saya baca.<br><br>I drew my own conclusions about the content of the text I read. | 1 2 3 4 5 6 7 |
| 20. | Saya menterjemah rangkai kata dan ayat bahasa Inggeris ke dalam bahasa ibunda saya.<br><br>I translated English phrases/ sentences into my native language. | 1 2 3 4 5 6 7 |
| 21. | Saya menggunakan pembayang maksud berdasarkan konteks untuk meramal isi-isi yang akan saya temui di dalam ayat / perenggan seterusnya.<br><br>I used context clues to predict what points would come next in the succeeding sentences/ paragraphs of the text. | 1 2 3 4 5 6 7 |
| 22. | Saya menggunakan pengetahuan sains saya sendiri untuk memahami dengan lebih jelas isi-isi yang rumit di dalam teks.<br><br>I used my knowledge of science to clarify some complicated points in the text. | 1 2 3 4 5 6 7 |
| 23. | Saya menilai secara kritis maklumat yang disampaikan di dalam teks berdasarkan perkara yang saya tahu mengenai topik tersebut.<br><br>I critically evaluated the information presented in the text based on what I know about the topic. | 1 2 3 4 5 6 7 |
| 24. | Saya mengambarkan maklumat yang diberi dalam teks untuk membantu saya mengingati perkara yang saya baca.<br><br>I visualized the information given in the text to help me remember what I read. | 1 2 3 4 5 6 7 |

| | | |
|---|---|---|
| **1 2**<br>**Langsung tidak benar tentang cara saya membaca tadi** | **3 4 5**<br>**Sederhana benar tentang cara saya membaca tadi** | **6 7**<br>**Sangat benar tentang cara saya membaca tadi** |

| | | |
|---|---|---|
| 25. | Saya mengubah suai kelajuan bacaan saya berdasarkan perkara/ bahan yang sedang saya baca.<br><br>I adjusted my reading speed according to what I was reading. | 1 2 3 4 5 6 7 |
| 26. | Pada akhir pembacaan saya, saya mengetahui sejauh mana saya memahami teks tersebut.<br><br>By the end of my reading task, I knew how much I understood the text. | 1 2 3 4 5 6 7 |
| 27. | Apabila teks menjadi sukar, saya membaca teks secara kuat untuk membantu saya memahami perkara yang sedang saya baca.<br><br>When text became difficult, I read aloud to help me understand what I read. | 1 2 3 4 5 6 7 |
| 28. | Sebelum membaca teks tersebut, saya meneliti gambar rajah yang diberi dan cuba memahaminya terlebih dahulu.<br><br>Before reading the text, I looked carefully at the diagram provided and tried to understand it. | 1 2 3 4 5 6 7 |
| 29. | Saya terpaksa meneka banyak maksud perkataan di dalam teks untuk memahami kandungannya.<br><br>I had to work out the meanings of many words in the text to understand the content. | 1 2 3 4 5 6 7 |
| 30. | Saya menghafal isi-isi penting di dalam teks untuk memastikan saya mengingati kesemuanya.<br><br>I memorized important points in the text to ensure that I remember them. | 1 2 3 4 5 6 7 |
| 31. | Saya menguji kefahaman sendiri dengan mengemukakan beberapa soalan semasa membaca.<br><br>I tested my comprehension by asking myself questions during the reading process. | 1 2 3 4 5 6 7 |
| 32. | Saya menggunakan klu yang terdapat dalam ayat/teks untuk memahami maksud perkataan yang tidak diketahui.<br><br>I used contextual clues in the text to understand the meaning of unknown words. | 1 2 3 4 5 6 7 |

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| **1 2**<br>**Langsung tidak benar tentang cara saya membaca tadi** | **3 4 5**<br>**Sederhana benar tentang cara saya membaca tadi** | **6 7**<br>**Sangat benar tentang cara saya membaca tadi** |

| | | |
|---|---|---|
| 33. | Saya ada keinginan untuk menggunakan bahan rujukan seperti kamus untuk membantu saya memahami perkara yang sedang saya baca tadi.<br><br>I had the urge of using reference materials such as dictionaries to help me understand what I was reading. | 1 2 3 4 5 6 7 |
| 34. | Saya membuat andaian-andaian/ *inferen-inferen* mengenai kandungan teks yang saya baca.<br><br>I made inferences about the content of the text I read. | 1 2 3 4 5 6 7 |
| 35. | Saya menulis ringkasan mengenai kandungan teks dengan menggunakan perkataan saya sendiri.<br><br>I wrote summary in my own words about the content of the text. | 1 2 3 4 5 6 7 |
| 36. | Saya membuat hipotesis mengenai kandungan teks yang saya baca.<br><br>I formed hypotheses about the content of the text I read. | 1 2 3 4 5 6 7 |
| 37. | Saya menghuraikan maklumat yang terdapat di dalam teks tersebut dengan menggunakan contoh saya sendiri.<br><br>I elaborated the information I found in the text using my own examples. | 1 2 3 4 5 6 7 |
| 38. | Saya menganalisis secara kritis maklumat yang disampaikan di dalam teks.<br><br>I critically analyzed the information presented in the text. | 1 2 3 4 5 6 7 |
| 39. | Saya membandingkan penerangan yang ditulis dengan gambar rajah yang diberi secara serentak.<br><br>I compared the written description in the text with the diagram provided simultaneously. | 1 2 3 4 5 6 7 |
| 40. | Soalan-soalan yang saya ajukan kadangkala terjawab di bahagian seterusnya di dalam teks.<br><br>The questions I asked during reading were sometimes answered in the latter part of the text. | 1 2 3 4 5 6 7 |

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| 41. | Apabila saya tidak memahami sesuatu, saya meneruskan pembacaan dan berharap penjelasan akan ditemui di bahagian seterusnya.<br><br>When I didn't understand something, I kept on reading and hoped for clarification further on. | 1 2 3 4 5 6 7 |
| 42. | Saya menulis catatan atau menggunakan simbol untuk menunjukkan hubungan di antara satu isi dengan isi yang lain.<br><br>I wrote notes or used symbols to show relationships between points. | 1 2 3 4 5 6 7 |
| 43. | Apabila teks menjadi sukar, saya membacanya berulang kali untuk meningkatkan pemahaman saya.<br><br>When the text became difficult, I reread to increase my understanding. | 1 2 3 4 5 6 7 |
| 44. | Saya menggunakan jadual, gambar rajah dan gambar di dalam teks untuk meningkatkan pemahaman saya.<br><br>I used tables, figures, and pictures in text to increase my understanding. | 1 2 3 4 5 6 7 |
| 45. | Saya menggunakan perkataan seerti dalam bahasa Inggeris untuk perkataan yang susah supaya saya memahami maksud perkataan-perkataan tersebut.<br><br>I used synonyms in English for difficult words so that I understood the meanings of those words. | 1 2 3 4 5 6 7 |
| 46. | Saya menggariskan atau membulatkan maklumat di dalam teks untuk membantu saya mengingatinya.<br><br>I underlined or circled information in the text to help me remember it. | 1 2 3 4 5 6 7 |
| 47. | Apabila membaca teks, saya memfokuskan kepada maksud keseluruhan teks tersebut.<br><br>When reading the text I focused on getting the overall meaning of the text. | 1 2 3 4 5 6 7 |
| 48. | Saya membaca teks berulang kali untuk memahami gambar rajah yang diberikan.<br><br>I read the text repeatedly to understand the diagram provided in it. | 1 2 3 4 5 6 7 |

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|---|---|---|
| 49. | Saya meramalkan isi kandungan yang akan ditemui dalam bahagian teks yang seterusnya.<br><br>I predicted what content would occur in succeeding portions of the text. | 1 2 3 4 5 6 7 |
| 50. | Saya abaikan perkataan yang tidak diketahui.<br><br>I skipped unknown words. | 1 2 3 4 5 6 7 |
| 51. | Saya membuat perkaitan antara maklumat baru yang saya temui di dalam teks dengan pengetahuan sains yang sedia ada untuk membantu saya memahami teks dengan lebih baik lagi.<br><br>I made associations between the new information I found in the text with my existing knowledge of science to help me understand the text better. | 1 2 3 4 5 6 7 |
| 52. | Saya mengulangi bacaan bagi bahagian-bahagian tertentu dalam teks untuk mencari hubungan di antara isi-isi di dalam teks.<br><br>I went back and forth in the text to find relationships among the points in it. | 1 2 3 4 5 6 7 |
| 53. | Saya menguji kefahaman saya tentang kandungan teks dengan menerangkan gambar rajah kepada diri sendiri selepas selesai membacanya.<br><br>I tested my understanding of the content by describing the diagram to myself when I have finished reading. | 1 2 3 4 5 6 7 |
| 54. | Saya cuba berbalik kepada tujuan asal membaca apabila saya hilang tumpuan.<br><br>I tried to get back on track when I lose concentration. | 1 2 3 4 5 6 7 |
| 55. | Saya membaca teks sepintas lalu terlebih dahulu untuk mendapat gambaran tentang ciri-ciri teks seperti panjang pendeknya dan organisasi teks.<br><br>I skimmed the text first by noting characteristics like length and organization. | 1 2 3 4 5 6 7 |
| 56. | Saya cuba memahami setiap perkataan untuk membantu saya memahami kandungan teks.<br><br>I tried to understand every word to help me understand the content of the text. | 1 2 3 4 5 6 7 |

| | | |
|---|---|---|
| 57. | Saya membuat catatan semasa membaca untuk membantu saya memahami perkara yang saya baca.<br><br>I took notes while reading to help me understand what I read. | 1 2 3 4 5 6 7 |
| 58. | Saya menguji kefahaman saya tentang kandungan teks dengan mengemukakan beberapa soalan kepada diri sendiri selepas membaca teks.<br><br>I tested my understanding of the text content by asking myself questions after reading the texts. | 1 2 3 4 5 6 7 |
| 59. | Saya membaca semula ayat-ayat di dalam teks apabila saya keliru.<br><br>I reread the sentences when I got confused. | 1 2 3 4 5 6 7 |
| 60. | Saya membaca setiap ayat untuk memastikan saya tidak meninggalkan mana-mana isi penting.<br><br>I read every sentence to make sure I did not miss any important point. | 1 2 3 4 5 6 7 |
| 61. | Saya menghubungkan konsep-konsep yang mempunyai perkaitan dengan menggunakan gambar rajah struktur organisasi (carta organisasi) yang menunjukkan hubungan/ kaitan antara satu konsep dengan konsep yang lain.<br><br>I connected related concepts using a diagrammatical organizational structure which shows how each concept is related to the other concepts. | 1 2 3 4 5 6 7 |
| 62. | Saya menggunakan bantuan teknik cetakan seperti **bold** dan *perkataan condong* untuk mengenal pasti maklumat penting.<br><br>I used typographical aids like **boldface** and *italics* to identify key information. | 1 2 3 4 5 6 7 |
| 63. | Saya menilai semula perkataan yang saya teka pada awalnya apabila maklumat di dalam teks bercanggah.<br><br>I re-evaluated the words that I guessed earlier when the ideas in the text did not add up. | 1 2 3 4 5 6 7 |
| 64. | Apabila membaca teks tersebut, saya memfokuskan kepada maksud setiap perkataan.<br><br>When reading the text, I focused on understanding the meaning of each word. | 1 2 3 4 5 6 7 |

65. Saya membahagikan ayat-ayat kepada rangkai kata pendek untuk membantu saya memahami teks. 1 2 3 4 5 6 7

I split up (break) sentences into short phrases to help me understand the text.

66. Apabila teks menjadi sukar, saya memberikan perhatian yang lebih kepada perkara yang sedang saya baca. 1 2 3 4 5 6 7

When text became difficult, I paid closer attention to what I was reading.

67. Saya meninjau teks secara sepintas lalu untuk mengetahui kandungannya sebelum membaca teks tersebut. 1 2 3 4 5 6 7

I previewed the text to see what it was about before reading it.

68. Saya mengimbas kembali tentang perkara yang saya ketahui mengenai topik yang dibentangkan untuk membantu saya memahami perkara yang saya baca. 1 2 3 4 5 6 7

I reflected on what I know about the topic to help me understand what I read.

69. Saya membaca teks dengan perlahan tetapi berhati-hati untuk memastikan saya memahami perkara yang saya baca. 1 2 3 4 5 6 7

I read slowly but carefully to be sure I understood what I was reading.

70. Saya memberikan perhatian kepada struktur bahasa untuk membantu saya memahami ayat-ayat di dalam teks tersebut. Contoh, ayat pasif. 1 2 3 4 5 6 7

I paid attention to the language structure to help me understand the sentences. Eg. Passive sentences.

71. Saya berhenti dari semasa ke semasa untuk berfikir tentang perkara yang sedang saya baca. 1 2 3 4 5 6 7

I stopped from time to time and thought about what I was reading.

72. Saya mengungkapkan ayat-ayat di dalam teks ke dalam bahasa yang lebih mudah untuk lebih memahami perkara yang saya baca. 1 2 3 4 5 6 7

I paraphrased the sentences into simpler language to better understand what I read.

| 1 2 | 3 4 5 | 6 7 |
|---|---|---|
| **Langsung tidak benar tentang cara saya membaca tadi** | **Sederhana benar tentang cara saya membaca tadi** | **Sangat benar tentang cara saya membaca tadi** |

| | | |
|---|---|---|
| 73. | Saya bulatkan perkataan yang penting yang menyumbang kepada pemahaman teks tersebut.<br><br>I circled words that were important to the understanding of the text. | 1 2 3 4 5 6 7 |
| 74. | Saya menukar taktik pembacaan saya apabila saya masih tidak memahami teks tersebut.<br><br>I changed my reading tactics when I found that I still did not understand the text. | 1 2 3 4 5 6 7 |
| 75. | Saya bertanya soalan kepada diri sendiri mengenai maksud perkataan di dalam teks.<br><br>I asked myself questions about meaning of words in the text. | 1 2 3 4 5 6 7 |
| 76. | Semasa saya sedang membaca, saya menggaris perkara-perkara yang tidak jelas atau yang saya tidak tahu dan kemudian saya akan merangka strategi untuk menyelesaikan masalah tersebut.<br><br>As I was reading, I underlined down things that were unclear or not known to me and then I formulated a strategy for resolving these problems. | 1 2 3 4 5 6 7 |
| 77. | Selepas membaca teks saya mengulangkaji kandungan dengan menyebut isi-isi penting secara sepintas lalu.<br><br>After reading the text I revised the content by briefly going through the important points. | 1 2 3 4 5 6 7 |
| 78. | Untuk lebih memahami bahagian teks yang sukar, saya menceritakan apa yang saya fahami kepada diri sendiri dalam bahasa yang mudah.<br><br>To get a better understanding of the difficult parts in the text, I explained in plain language to myself about what I had understood so far. | 1 2 3 4 5 6 7 |
| 79. | Melukis peta minda semasa membaca teks amat membantu pemahaman saya terhadap kandungan teks.<br><br>Drawing mind maps while reading the text helped me to understand the content of the text. | 1 2 3 4 5 6 7 |
| 80. | Semasa saya sedang membaca, saya menggaris perkara-perkara yang dianggap penting untuk diulangkaji selepas habis membaca.<br><br>As I was reading, I underlined important points so that I could revise them after I finished reading. | 1 2 3 4 5 6 7 |

# COGNITVE AND METACOGNITIVE STRATEGIES IN READING SCIENTIIFC TEXTS AMONGST FIRST YEAR SCIENCE UNDERGRADUATES

## RETROSPECTIVE INTERVIEW PROTOCOL

Items emphasized during the interview session:

1. Metacognitive awareness about reading
2. Covert strategy
3. Reasons and conditions for the strategy chosen while reading

**PART 1: Determining Respondent's Metacognitive Awareness of Reading**

1. What is reading?
   *Apakah yang anda faham tentang istilah membaca?*

2. What do you understand about reading academic texts?
   *Apakah yang anda faham tentang membaca bahan akademik?*

3. What do you think about your competence in biology?
   *Apakah pendapat anda tentang keupayaan anda dalam subjek biologi?*

4. What do you think about your ability to read biology texts in English?
   *Apakah pendapat anda tentang keupayaan anda membaca teks biologi dalam bahasa Inggeris?*

5. What was your objective of reading the text just now? To understand each details or to get a general understanding of the content?
   *Apakah objektif anda semasa membaca tadi?Untuk memahami setiap detail atau untuk mendapat pemahaman am tenetang kadungan teks.*

6. What plans did you make before and while you were reading?
   *Apakah perancangan anda sebelum dan semasa membaca tadi?*

7. What were the strategies that you were aware of using while reading just now?
   *Apakah strategi yang anda sedar anda gunakan semasa anda membaca tadi?*

8. What were other things that you were aware of doing while reading just now?
   *Apakah perkara lain yang anda lakukan secara sedar semasa membaca tadi?*

9. Do you know what to do when you encounter problems while reading a text?
   *Adakah anda tahu apa yang perlu dilakukan apabila anda menghadapi masalah semasa membaca teks?*

10. What would you do when you encountered problems while reading?
    *Apakah yang anda mungkin lakukan apabila anda menghadapi masalah ketika membaca?*

**PART 2: Identifying Respondent's Covert Strategies**

1. When you were reading, was your priority to understand pieces of information or overall comprehension?
   *Adakah you cuba memahami maklumat dalam bentuk kecil-kecil atau untuk memdapatkan gambaran sepenuhnya?*

2. Were you trying to understand each word/ sentence in a paragraph? Why? Why not?
   *Adakah anda cuba memahami setiap perkataan/ ayat dalam setiap perenggan? Kenapa? Kenapa tidak?*

3. What did you do when you saw words or phrases in bold print?
   *Apakah yang anda lakukan apabila nampak perkataan atau frasa dalam cetakan* ***bold.***

4. What were the things that you always did while trying to understand the text just now?
   *Apakah perkara yang anda sering lakukan untuk memahami teks tadi?*

**PART 3: Determining Reasons and Conditions for the Chosen Strategy**
*(These are just some examples of interview questions based on observed strategies used by each respondent during the think aloud procedure. The questions listed below were posed to respondents after the think aloud procedures during the pilot study.)*

1. Why did you paraphrase the sentence (*pinpoint the sentence in the text*) in your mother tongue?
   *Kenapakah anda paraphrase ayat tadi dalam bahasa ibunda?*

2. Why did you slow down your reading in paragraph _____just now?
   *Kenapakah anda memperlahankan bacaan di perenggan _____ tadi?*

3. Why did you break up the word/ sentence?
   *Kenapakah anda pecahkan perkataan/ ayat tersebut?*

4. What was it that you questioned when you said "what is this?" (Paragraph 1, sentence 1 & 2)
   *Apakah yang anda persoalkan semasa anda berkata "apa benda ni?" (Perenggan 1, ayat 1 & 2)*

5. When you looked at the picture/diagram and did not understand it, why did you continue reading the next paragraph?
   *Apabila anda melihatgambar dan tidak memahaminya, kenapa anda teruskan pembacaan ke perenggan seterusnya?*

6. What usually prohibited you from getting a better understanding of the sentence/ paragraph/ text?
   *Apakah yang biasanya menghalang anda dari memdapat pemahaman yang baik semasa membaca ayat/perenggan/ teks tadi?*

7. Sometimes you said you "understood a bit" or "didn't really understand". What actually helped you to understand "a bit" ? What prevented you from understanding the text clearly?
   *Kadang-kadang anda mengatakan "faham sedikit" atau "tak faham sangat". Apakah yang membantu anda memahami "sedikit"? Apakah yang memghalang anda dari memahami banyak?*

8. What was your action when you knew you understood "a bit"? Was it enough?
   *Apakah tindakan anda apabila anda hanya memahami "sedikit'? Adakah ia cukup?*

9. What was the purpose of your reading the content repeatedly?
   *Apakah tujuan anda membaca berulang-ulang isi –isi teks tadi?*

10. What was the purpose of your rereading the content in your mother tongue?
    *Apakah tujuan anda apabila mengulang baca isi-isi teks dalam bahasa ibunda?*

**Training Script (Practice 1)**

Okay, terima kasih kerana menerima jemputan saya untuk mengambil bahagian dalam kajian yang akan saya jalankan. Latihan membaca dan berfikir secara nyaring untuk kali pertama ini akan mengambil masa lebih kurang satu jam.

Membaca sambil berfikir secara nyaring bertujuan untuk mengkaji apa yang difikirkan oleh pembaca semasa mereka membaca teks. Ini adalah kerana tujuan kajian ini adalah menyiasat aktiviti yang berlaku di dalam minda seseorang pembaca dan perkara-perkara yang bermain-main di minda dalam usaha pembaca itu untuk memahami teks yang sedang dibaca. Jika pembaca membaca secara senyap, pengkaji tidak akan dapat mengetahui apa yang sedang pembaca fikirkan. Oleh itu, saya akan meminta semua responden untuk membaca sambil berfikir secara nyaring dua teks saintifik dalam kajian sebenar nanti. Sebelum kajian sebenar dapat dibuat, saya akan melatih anda semua bagaimana untuk membaca dan berfikir secara nyaring.

Sebentar lagi, saya akan edarkan satu teks saintifik untuk sesi latihan membaca dan berfikit secara nyaring. Anda dikehendaki untuk membaca teks ini sebagaimana anda membaca buku teks akademik anda, artikel yang diberi oleh pensyarah anda atau teks yang dibaca untuk menduduki peperiksaan, iaitu untuk memahami topik dan kanduangan yang dibincangkan oleh penulis. Sambil anda membaca, anda dikehendaki megucapkan apa yang anda sedang fikirkan pada masa itu. Jika anda sedang terfikirkan sesuatu perkataan yang dibaca itu susah, anda perlu mengucapkannya, sebagai contoh, “eh, perkataan ini saya tak tahu maknaya…” atau, “saya pernah jumpa perkataan ini, tapi says tak ingat sekarang”. Jika anda terfikir yang anda memahami atau tidak memahami ayat yang sedang dibaca, mungkin anda boleh mengatakan, “saya faham ayat ini” atau “saya tidak faham ayat ini.” Anda juga perlu mengucapkan segala apa yang terlintas difikiran semasa sedang membaca, contohnya “oh..saya terbayangkan seorang saintis sedang bekerja di dalam makmal…” atau “ayat ni agak susah, saya perlu membaca yat ni balik untuk memahaminya” atau “Oh…maksud ayat ini adalah jika seseorang itu otak smanusia  mempunyai dua organ yang mengawal tidur.”

Secara ringkasnya, anda dikehendaki untuk membuat apa saja demi memahami teks yang diberi dan setiap tindakan dan aktiviti minda anda hendaklah diucapkan secara nyaring supaya boleh direkodkan oleh pita rakaman dan dikaji oleh penyelidik nanti.

Ini adalah tek saintifik untuk latihan yang pertama. Saya telah tandakan simbol bulat berpalang pada hujung setiap dua atau tiga ayat. Tujuannya adalah untuk mengingatkan anda untuk berhenti dan mengucapkan apa yang sedang dan telah anda fikirkan dan apa yang akan anda buat seterusnya. Saya akan membaca perenggan pertama teks ini dan mendemonstrasi cara-cara untuk membaca dan berfikir secara nyaring. Kemudian, anda akan diberi peluang untuk mencuba perenggan-perenggan yang berikutnya.

An innate biological cycle of about 24 hours is called a **circadian rhythm** (from the Latin *circa*, about, and *dies*, day). A circadian rhythm persists even when an organism is sheltered from environmental cues ⊖. A *Mimosa* plant, for example, exhibits sleep movements at about the same interval even if kept in constant light or darkness. Thus, circadian rhythms occur with or without external stimuli such as sunrise and sunset. Research on many organisms indicates that circadian rhythms are controlled by internal timekeepers called **biological clocks** ⊖.

| | |
|---|---|
| *An innate biological cycle of about 24 hours is called a* ***circadian rhythm*** *....* | Reading aloud |
| Oh saya terbayangkan circle – bulatan bila baca perkataan circadian rhythm….<br>Saya teruskan… | Visualizing |
| *(from the Latin circa, about, and dies, day).*<br>Circa bermaksud about …mengenai… dan dian dari perkataan dies atau hari…<br>Maksudnya….circadian adalah mengenai hari…. | Reading aloud<br>Translating |
| Boleh tak circadian itu bermaksud pusingan hari? Tak apa lah, saya teruskan. | Questioning |
| *A circadian rhythm persists even when an organism is sheltered from environmental cues ⊖.* | Reading aloud |
| Emm.. saya tak berapa faham ayat ni. Saya ulang balik… | Acknowledging lack of comprehension |
| *A circadian rhythm persists even when an organism is sheltered from environmental cues ⊖.* | Rereading aloud |
| Apa ye? maksudnya…rhythm mengenai hari ni berterusan walaupun organism itu dilindungi oleh environmental cues… | Questioning translating |
| Cues apa? | Questioning |

| | |
|---|---|
| Oh…masa saya belajar biologi di tingkatan lima saya ada belajar pasal environmental cues…ianya passal signal alam semulajadi. | Assessing prior knowledge |
| Apakah signal alam semulajadi tu…apa kaitannya dengan circadian rhythm? | Questioning |
| Saya teruskan | |
| *A Mimosa plant, for example, exhibits sleep movements at about the same interval even if kept in constant light or darkness.* | Reading aloud |
| Mimosa plant…apa ye mimosa plant...? | Questioning |
| Tapi ayat ni saya faham…maksudnya pokok mimosa ni jadual tidur dia sama saja walaupun diletakkan dalam keadaan gelap atau cerah yang berterusan.<br>Oh…maknanya environmental cues tadi mungkin siang dan malam… | Acknowledging understanding translating<br>Answering own question |
| *Thus, circadian rhythms occur with or without external stimuli such as sunrise and sunset. Research on many organisms indicates that circadian rhythms are controlled by internal timekeepers called* ***biological clocks*** ⊖. | Reading aloud |
| Okay, saya dah faham… | Acknowledging understanding |
| Betullah tekaan saya tadi…sebenarnya circadian rhythm ni adalah bulatan atau pusingan hari yang ada dalam benda hidup…ada masa kita akan mengantuk untuk tidur, ada masa kita akan celik dan berjaga…itu lah maksudnya biological clock…. | Confirming guesses<br>Summarizing |

Sekarang, anda boleh cuba pula membaca secara nyaring perenggan kedua. (respondent membaca secara nyaring bersendirian). Baiklah, sekarang cuba baca dua ayat pertama dalam perenggan ketiga. Wan, anda baca dan yang lain dengar. Zeti, cuba baca ayat seterusnya sehingga tanda berhenti bulatan berpalang [⊖**].** Riz anda pula cuba untuk ayat yang berikutnya. Ann baca yang seterusnya. Baiklah, sekarang saya akan edarkan satu lagi teks saintifik. Cuba anda baca dalam kumpulan dua orang. Setiap orang baca dua perenggan. Bantu rakan anda yang mengalami kesukaran untuk menlaporkan apa yang sedang mereka fikirkan… Anda boleh pulang setelah habis membaca teks yang kedua ini. Perjumpaan yang akan datang, kita akan cuba berlatih dengan satu teks saja.

# PRACTICE TEXT

## INNATE BIOLOGICAL CLOCKS AND PHOTOPERIOD OF PLANTS

Source:

Campbell, N. A., Mitchell, L. G., & Reece, J. B. (2000). *Biology: Concepts and Connections* (3rd ed.). San Francisco, CA: Addison & Wesley Longman, Inc.

**Arahan:**

Sila baca dan **cuba sedaya upaya anda untuk memahami** teks saintifik yang dilampirkan. Untuk kajian ini, anda diminta supaya membaca teks dengan mengeluarkan suara. Anda juga diminta untuk melafazkan setiap perkara yang terlintas di kepala anda semasa membaca teks. Untuk membantu anda membaca sambil melafazkan pemikiran anda, sila berhenti di akhir ayat yang bertanda ⊖**,** dan lafazkan apa yang anda sedang fikirkan tentang teks/gambar/gambaran dan pengetahuan yang muncul di minda anda/ tindakan anda seterusnya atau apa-apa saja pada masa tersebut. Anda juga digalakkan untuk melafazkan pemikiran anda walaupun anda tidak sampai lagi pada tanda ini ⊖**.** Selepas anda memahami topik perbincangan itu dan telah bersedia untuk menjawab soalan (dalam bentuk esei dan objektif) berdasarkan teks ini, sila ketepikan teks ini. Anda **TIDAK BOLEH merujuk** kepada teks semasa menjawab soalan-soalan kefahaman. Anda dialu-alukan untuk membaca berulang kali dan membuat sebarang tanda, garisan, nota, lukisan dan lain lain catatan untuk membantu kefahaman anda di atas teks ini. Selamat membaca.

***Instruction:***

*Please read and try your **very best to understand** the content of the scientific text provided. For this study, you are requested to read the text aloud. You are also requested to verbalize your online thinking while reading the text. To assist you read and think aloud at the same time, please stop at the end of the sentence with this symbol* ⊖ *and verbalize what you are currently thinking or report what you think about the text/pictures/image/past knowledge that comes to mind/ your next move or anything at all at that very moment. You are encouraged to verbalize your thinking even when you have not reached the symbol* ⊖**.** *When you have understood the topic and are ready to answer the questions (one short essay and some objective questions) based on the text, please put this text aside. You **CANNOT refer** to the text while answering the comprehension questions. You are welcome to reread the text and make any markings, underlining, notes, drawing etc on the text as you please. Happy reading.*

An innate biological cycle of about 24 hours is called a **circadian rhythm** (from the Latin *circa*, about, and *dies*, day). A circadian rhythm persists even when an organism is sheltered from environmental cues ⊖. A *Mimosa* plant, for example, exhibits sleep movements at about the same interval even if kept in constant light or darkness. Thus, circadian rhythms occur with or without external stimuli such as sunrise and sunset. Research on many organisms indicates that circadian rhythms are controlled by internal timekeepers called **biological clocks** ⊖.

A biological clock not only times a plant's everyday activities, it may also influence seasonal events that are important in a plant's life cycle. Flowering, seed germination, and the onset and ending of dormancy are examples of stages in plant development that usually occur at specific times of the year ⊖. The environmental stimulus plants most often use to detect the time of the year is called **photoperiod**, the relative lengths of day and night. Plants whose flowering is triggered by photoperiod fall into two groups. One group, the short-day plants like Chrysanthemums, generally flower in late summer, autumn and winter, when light periods shorten ⊖. In contrast, long-day plants, like iris, usually flower in late spring or early summer, when light periods lengthen. Flowering and other responses to photoperiod are in fact controlled by *night length*, not day length and the **continuity of darkness is very critical** ⊖. Short-day plant will not flower until exposed to a continuous dark period exceeding a critical length (of up to about 10 hours). The short-day plant will not blossom if the nighttime part of the photoperiod is interrupted by even *a flash of light* ⊖.

But how does a plant measure photoperiod? Phytochromes are protein pigments with a light-absorbing component that function as photoreceptors or light decoders. Phytochromes were discovered as a result of studies on how different wavelengths of light affect flowering in short day and long-day plants ⊖. Bar 1 in Figure 33.12A displays the effect for two types of plants that receive a flash of light during their **critical dark period.** In bar 1, the letter R on the light flash stands for red light with a wavelength of 660nanometers (nm) ⊖. This type of light (which is one component of white daylight) is the most effective wavelength for interrupting night length. The other

three bars show how flashes of light of longer wavelength, around 730 nm, affect flowering ⊖. This type of light is called far-red (FR). As bar 2 shows, the effect of a flash of red light (R) that interrupts a period of darkness can be reversed by a subsequent flash of FR light: Both types of plants behave as though there is no interruption in the night length ⊖. Bars 3 and 4 indicate that no matter how many flashes of light a plant receives, only the wavelength of the last flash affects the plant's measurement of night length. Thus, the sequence R-FR-R produces the same results as in bar 1, and the sequence R-FR-R-FR yields the same effect as in bar 2 ⊖.

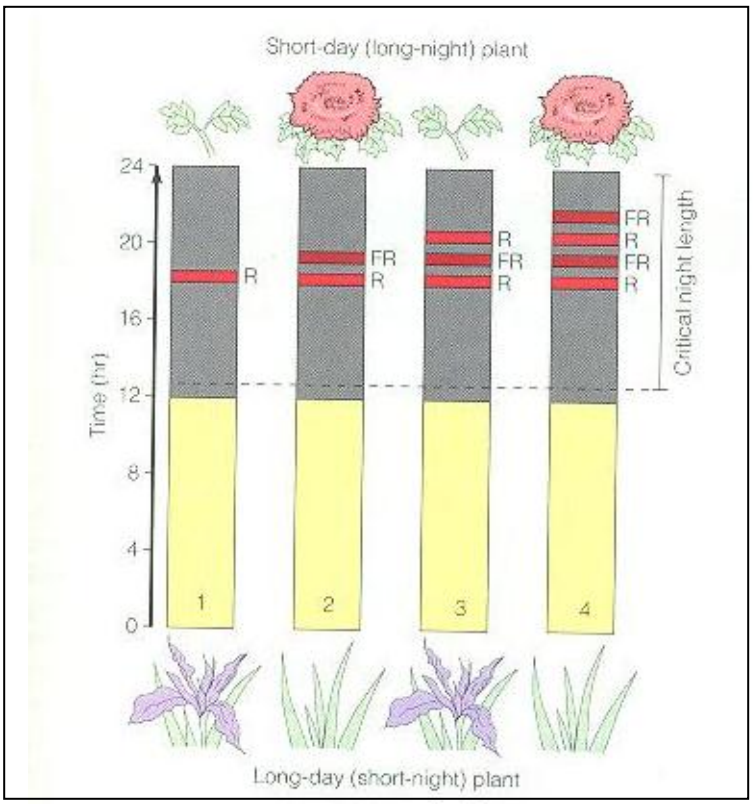


Figure 33.12A The reversible effects of red and far-red light

The role of phytochrome in the plant biological clock is significant in that it alternates between two forms that differ only slightly in structure. One form of phytochrome which absorbs red light is designated $P_r$ (red-absorbing phytochrome) and the other which absorbs far-red light is designated $P_{fr}$ (far-red-absorbing phytochrome) ⊖. As diagrammed in Figure 33.12B, when the $P_r$ form absorbs red light (660nm), it is quickly

converted to $P_{fr}$, and when $P_{fr}$ absorbs far-red light (730 nm), it is converted back to $P_r$. Also, $P_{fr}$ in a plant reverts to $P_r$ in the dark. The interconversions help account for the experimental results in Figure 33.12A ⊖.

In nature, the night is not punctuated by flashes of red and far-red light but instead, on each day, the conversion of $P_{fr}$ to $P_r$ occurs in the continuous darkness that follows sunset, without the participation of FR light ⊖. At sunrise, much of the phytochrome is rapidly converted from the $P_r$ form to $P_{fr}$ because sunlight is richer in red than in far-red light. Apparently, these phytochrome conversions are cues that set a plant's biological clock ⊖.

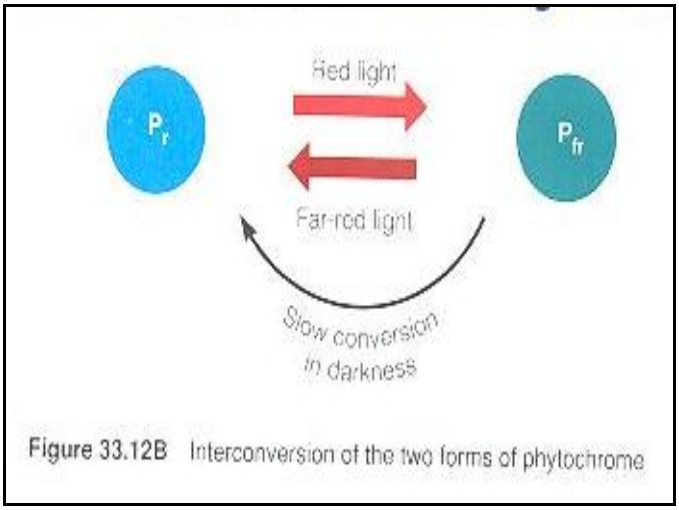


Figure 33.12B Interconversion of the two forms of phytochrome

| | |
|---|---|
| **Subject:** | Re: I need your expert advice |
| **From:** | "Stephen Rossiter" <sjrossiter@qmul.ac.uk> |
| **Date:** | Mon, October 1, 2007 9:36 pm |
| **To:** | samsiah@umt.edu.my |
| **Priority:** | Normal |
| **Create Filter:** | Automatically \| From \| To \| Subject |
| **Options:** | View Full Header \| View Printable Version \| View Message details |

Hi Sam

I have made a few edits, in pink. The original article from the book is OK. I hope these are useful
Good luck

Steve

My details are:

Dr Stephen Rossiter
Royal Society Research Fellow
School of Biological & Chemical Sciences
Queen Mary, University of London
London E1 4NS
United Kingdom

samsiah@umt.edu.my wrote:
Dear Dr. Rossiter,

I know you are extremely busy but I truly need your expertise to evaluate my research instruments. I am a PhD student in the Faculty of Education, University of Malaya, Kuala Lumpur, Malaysia. My dissertation is on the reading behaviors of first year science students when they read scientific texts in their second/foreign language. Malaysian students whose first language is not English are required to learn and read science in English, a policy which took effect in 2003. So, I am very interested to find out how they navigate through the English scientific texts. To do that, I have developed some research instruments to be used in my study. Among the research instruments are as follows:

1. Scientific Text (taken from a biology reference book)
2. Multiple True and False questions to assess reading comprehension (I developed the questions myself)
3. Prior Knowledge inventory to assess how much the students know about the text before reading it (I developed the questions myself).

I would be extremely grateful if you could take a look at these

instruments to evaluate the accuracy of the statements in the reading comprehension section and also the KEY provided. Please feel free to make corrections or comments on any of the statements in both research instruments. I desperately need to get an evaluation for validity of instruments from an expert in the area, which is biology. Sending my inventory through the email is my last effort in getting help from content lecturers. I am an English teacher, so my knowledge of science is very limited to truly validate these instruments which are based on the knowledge of science. I have been trying to get a local expert in the field to help for the last three months but to no avail. I am hoping a foreign expert could lend me a hand since I am quite desperate now that I have to collect my data in two months time. Findings from my study will be used to help second language students deal with scientific texts in English.

As I am required to include your evaluation in my dissertation, kindly include your name, title, affiliation, and other information which you would like to be included. Thank you very much for your time and effort.

Sam Hamid
Doctoral Student
University of Malaya
Kuala Lumpur

_____

Stephen Rossiter
School of Biological & Chemical Sciences
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London E1 4NS

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email s.j.rossiter@qmul.ac.uk

**Attachments:**

| | | | |
|---|---|---|---|
| Prior Knowledge - Topic Auxins SJR.doc | **165 k** | [ application/msword ] | Download |
| MCQ Tx A-1 SJR.doc | **161 k** | [ application/msword | Download |

Table 4M1

Loading Factor Value of Each Item in MAI

| Loading factor for items in each subscale of Knowledge of Cognition | | | | | |
|---|---|---|---|---|---|
| DK1 | .689 | PK1 | .614 | CK1 | .586 |
| DK2 | .680 | PK2 | .797 | CK2 | .662 |
| DK3 | .712 | PK3 | .727 | CK3 | .658 |
| DK4 | .615 | PK4 | .733 | CK4 | .779 |
| DK5 | .667 | | | CK5 | .676 |
| DK6 | .668 | | | | |
| DK7 | .629 | | | | |
| DK8 | .502 | | | | |
| Loading factor for items in each subscale of Regulation of Cognition | | | | | |
| PC1 | .682 | MC1 | .581 | OIC1 | .436 |
| PC2 | .616 | MC2 | .606 | OIC2 | .641 |
| PC3 | .743 | MC3 | .674 | OIC3 | .683 |
| PC4 | .574 | MC4 | .655 | OIC4 | .552 |
| PC5 | .656 | MC5 | .623 | OIC5 | .598 |
| PC6 | .547 | MC6 | .598 | OIC6 | .684 |
| PC7 | .747 | MC7 | .741 | OIC7 | .495 |
| | | | | OIC8 | .650 |
| | | | | OIC9 | .657 |
| | | | | OIC10 | .436 |
| DSC1 | .622 | EC1 | .568 | | |
| DSC2 | .719 | EC2 | .544 | | |
| DSC3 | .746 | EC3 | .594 | | |
| DSC4 | .783 | EC4 | .766 | | |
| DSC5 | .714 | EC5 | .750 | | |
| | | EC6 | .803 | | |

Table 4M2

Loading Factor Value of Each Item in STARS Inventory

| Loading factor for items in each subscale of Metacognitive Strategies | | | | | | | |
|---|---|---|---|---|---|---|---|
| MCP1 | .679 | MCM1 | .682 | MCE1 | .638 | MCD1 | .518 |
| MCP2 | .607 | MCM2 | .748 | MCE2 | .798 | MCD2 | .772 |
| MCP3 | .671 | MCM3 | .592 | MCE3 | .728 | MCD3 | .753 |
| MCP4 | .567 | MCM4 | .746 | MCE4 | .847 | MCD4 | .662 |
| MCP5 | .703 | MCM5 | .772 | MCE5 | .672 | MCD5 | .782 |
| MCP6 | .566 | MCM6 | .612 | | | MCD6 | .636 |
| MCP7 | .722 | MCM7 | .750 | | | MCD7 | .594 |
| | | MCM8 | .729 | | | | |
| | | MCM9 | .703 | | | | |

| Loading factor for items in each subscale of Higher Cognitive Strategies | | | | | | | |
|---|---|---|---|---|---|---|---|
| HCV1 | .808 | HCAVd1 | .739 | HCIC1 | .678 | HCPK1 | .795 |
| HCV2 | .534 | HCAVd2 | .851 | HCIC2 | .659 | HCPK2 | .795 |
| HCV3 | .783 | HCAVd3 | .796 | HCIC3 | .721 | HCPK3 | .659 |
| HCV4 | .785 | HCAVd4 | .703 | HCIC4 | .778 | HCPK4 | .766 |
| HCV5 | .807 | | | HCIC5 | .756 | | |
| | | | | HCIC6 | .748 | | |
| HCIL1 | .844 | HCA1 | .894 | HCS1 | .837 | HCQc1 | .833 |
| HCIL2 | .844 | HCA2 | .894 | HCS2 | .811 | HCQc2 | .833 |
| | | | | HCS3 | .778 | | |
| HCGU1 | .737 | | | | | | |
| HCGU2 | .737 | | | | | | |

| Loading factor for items in each subscale of Lower Cognitive Strategies | | | | | | | |
|---|---|---|---|---|---|---|---|
| LCD1 | .630 | LCT1 | .925 | LCLU1 | .812 | LCMN1 | .753 |
| LCD2 | .458 | LCT2 | .918 | LCLU2 | .751 | LCMN2 | .860 |
| LCD3 | .708 | LCT3 | .575 | LCLU3 | .813 | LCMN3 | .720 |
| LCD4 | .764 | | | LCLU4 | .803 | LCMN4 | .817 |
| LCD5 | .715 | | | | | LCMN5 | .785 |
| | | | | | | LCMN6 | .830 |

Program Pengajian Doktor Falsafah
Fakulti Pendidikan
Universiti Malaya
50603 Lembah Pantai
Kuala Lumpur

Kepada,

En. Zulkarnian Mamat
Jabatan Bahasa dan Komunikasi
Fakulti Pengurusan Dan Ekonomi,
Universiti Malaysia Terengganu,
21030 Kuala Terengganu.

16 Mei 2007

Melalui,

Ketua Jabatan Bahasa dan Komunikasi
Fakulti Pengurusan Dan Ekonomi,
Universiti Malaysia Terengganu,
21030 Kuala Terengganu.

Tuan,

**Permohonan Membuat *Back Translation***

Dengan segala hormatnya perkara di atas dirujuk. Untuk makluman tuan, saya sedang menjalankan penyelidikan untuk memenuhi syarat ijazah kedoktoran dalam bidang Teaching of English as a Second Language (TESL).

2. Saya telah membangunkan satu inventori untuk mengkaji strategi pembacaan teks akademik sains di kalangan pelajar jurusan sains dalam bahasa Inggeris seperti dalam lampiran. Oleh kerana saya akan menggunakan dwi bahasa untuk inventori tersebut, saya telah menterjemahkannya dalam bahasa Melayu. Untuk mempastikan terjemahan saya tepat, saya memerlukan jasa baik tuan untuk menterjemahkan kembali inventori tersebut ke dalam bahasa Inggeris.

3. Saya memerlukan terjemahan tersebut selewat-lewatnya pada 24 Mei 2007 dan akan memberi sedikit cenderamata atas kerjasama tuan. Sila hubungi saya di talian 019-9360553 (hp) atau 09-6665553 (rumah) untuk perbincangan selanjutnya. Pertimbangan dan sokongan tuan didahului dengan ucapan ribuan terima kasih.

**Sekian.**

**Yang benar,**

(SAMSIAH ABDUL HAMID)

## THINK ALOUD PRACTICE TEXT 4

## BIOMATERIALS FOR ORGAN REGENERATION

Biomaterials studied for organ regeneration and tissue engineering involve biocompatible and **biodegradable synthetic polymers**. These materials usually function as a scaffold for the growth and organization of implanted organ cells ⊖. **Parencymal cells** are isolated from the tissue and seeded into the polymer, and the cell-polymer structure is implanted (Figure 1) into the body ⊖ . Basically, the scaffold degrades simultaneously as the cells proliferate and excrete their ECM substances, bodily extracellular matrix proteins such as collagen and glycosaminoglycans ⊖. The growing cells, ECM, and nutrient-supplying vascular tissue continually replace the void spaces of the disappearing scaffold until eventually the scaffold/ cell implant has been replaced by natural organ tissue ⊖.

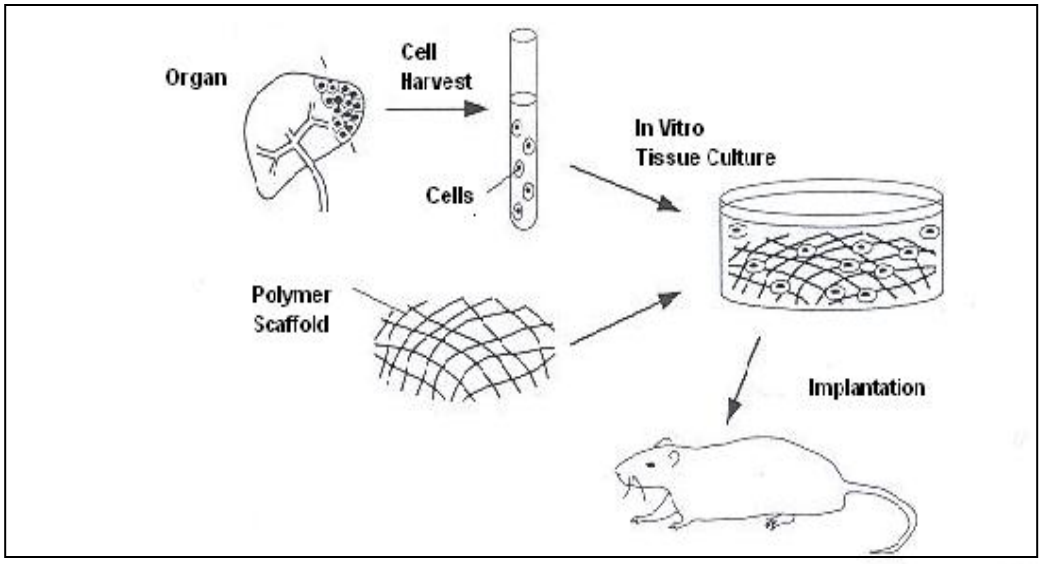


Figure 1. Schematic representation of organ regeneration methodology by cell transplantation using biodegradable polymer scaffold.

| No Kad Pengenalan/ *NRIC:* | | | | | | | - | | | - | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|

# TEXT A

## AUXINS AND ELONGATION OF CELLS

Source:

Campbell, N. A., Mitchell, L. G., & Reece, J. B. (2000). *Biology: Concepts and Connections* (3rd ed.). San Francisco, CA: Addison & Wesley Longman, Inc.

**Arahan:**
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***Instruction:***
*Please read and try your **very best to understand** the content of the scientific text provided. For this study, you are requested to read the text aloud. You are also requested to verbalize your online thinking while reading the text. To assist you read and think aloud at the same time, please stop at the end of the sentence with this symbol* ⊖ *and verbalize what you are currently thinking or report what you think about the text/pictures/image/past knowledge that comes to mind/ your next move or anything at all at that very moment. You are encouraged to verbalize your thinking even when you have not reached the symbol* ⊖**.** *When you have understood the topic and are ready to answer the questions (one short essay and some objective questions) based on the text, please put this text aside. You **CANNOT refer** to the text while answering the comprehension questions. You are welcome to reread the text and make any markings, underlining, notes, drawing etc on the text as you please. Happy reading.*

**Introduction**

Plant biologists have identified five major types of plant hormones; **auxins**, **cytokinins**, **gibberellins**, **abscisic acid** (ABA), and **ethylene**. Like animals, plants produce hormones in very small amounts, but a minute amount of any of these chemicals can have profound effects on the target cells. Hormones stimulate growth by signaling target cells to divide or elongate; some of the hormones inhibit growth by depressing cell division or elongation ⊖.

**What is auxin?**

Auxins, the first plant hormones to be discovered, have been demonstrated to be a basic coordinative signal of plant development. Their pattern of active transport through the plant is complex, and auxins typically act in concert with (or opposition to) other plant hormones ⊖. For example, the ratio of auxin to cytokinin in certain plant tissues determines initiation of root versus shoot buds. As a result, a plant can (as a whole) react on external conditions and adjust to them, without requiring a nervous system ⊖.

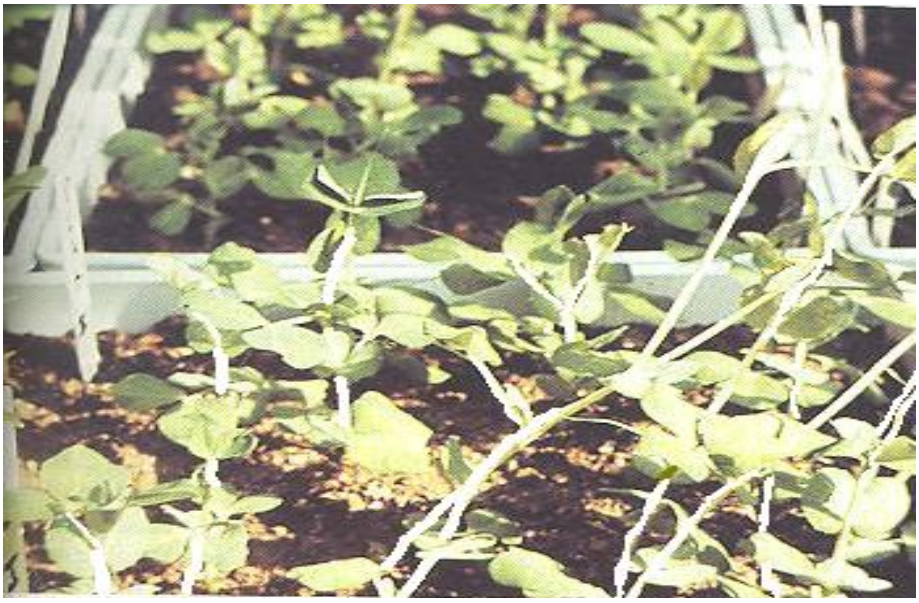

Figure 1 The effect of auxin (IAA) on pea plant

The term auxin is used to describe a class of chemicals whose chief function is to promote the elongation of developing shoots. Several auxins occur naturally in plants, and many others have been synthesized by chemists ⊖. The natural auxin that has been extracted from plants is a compound named **indoleacetic acid**, or IAA. Figure 1 shows

the effect of IAA on growing pea plants. All the seedlings in the photograph were grown under controlled conditions for the same length of time except for one difference; the taller seedlings, on the right, were treated with IAA ⊖.

The major site of auxin synthesis in a plant is the **apical meristem** at the tip of a shoot. A meristem (Greek *meristos*, divided) consists of localized, unspecialized cells that divide and generate new cells and tissues ⊖. As auxin produced in the tip moves downward, it stimulates growth of the stem by making cells elongate An important principle of plant organization based upon auxin distribution is **apical dominance**, which means that the auxin produced by the apical bud (or growing tip) diffuses downwards and inhibits the development of ulterior lateral bud growth, which would otherwise compete with the apical tip for light and nutrients ⊖. Removing the apical tip and its suppressive hormone allows the lower dormant lateral buds to develop, and the buds between the leaf stalk and stem produce new shoots which compete to become the lead growth. This behavior is used in pruning by horticulturists ⊖.

**The Effects of IAA Concentration Levels on Target Cells**

IAA promotes cell elongation in stems only over a certain concentration range, as the second (thick) curve in the Figure 2 shows.

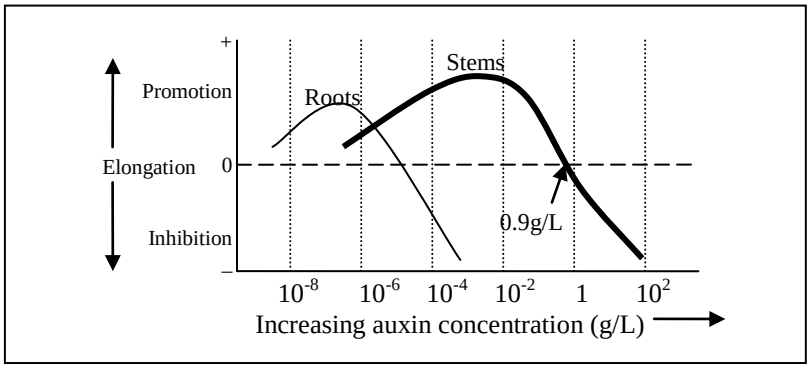


Figure 2 The effect of auxin concentration on cell elongation

Above certain level (0.9g of auxin per liter of solution, in this case), it usually inhibits cell elongation in stems ⊖. This inability effect probably occurs because a high level of IAA makes the plant cells synthesize another hormone, ethylene, which generally counters the effects of IAA. The first (thin) curve on the graph shows the effects of IAA

on root growth ⊖. An IAA concentration too low to stimulate shoot cells will cause root cells to elongate. On the other hand, an IAA concentration high enough to make stem cells elongate is in the concentration range that inhibits root cell elongation ⊖. These effects of IAA on cell elongation reinforce two points: (1) the same chemical messenger may have different effects at different concentrations in one target cell, and (2) a given concentration of the hormone may have different effects on different target cells ⊖.

**Cell Elongation Involving Auxin**

How do auxins make plant cells elongate? One hypothesis is that auxins initiate elongation by weakening cell walls by stimulating certain proteins in a plant cell's plasma membrane to pump hydrogen ions into the cell wall (Figure 3) ⊖.

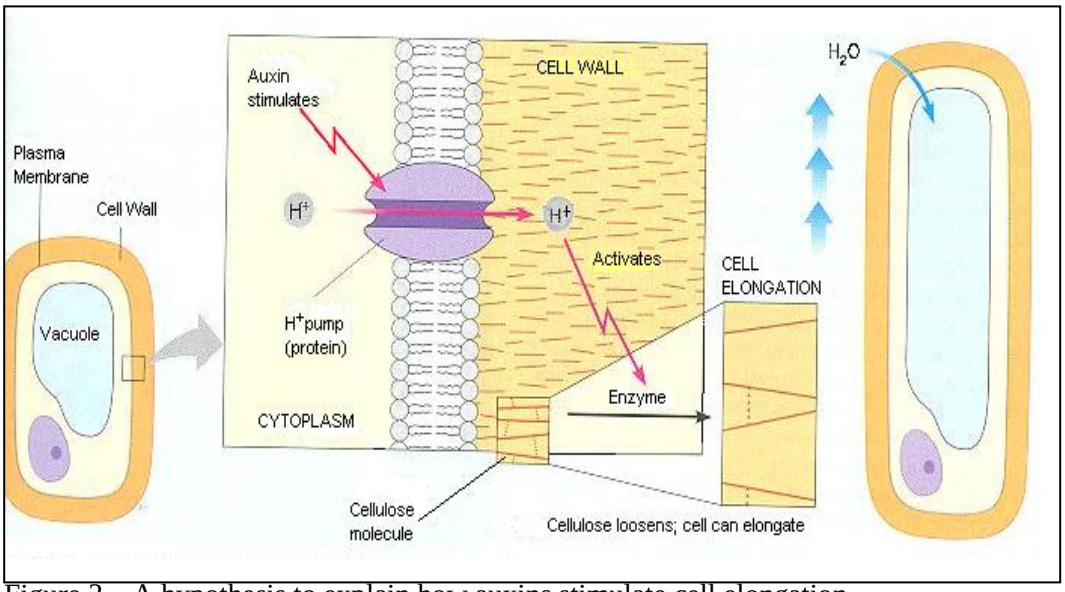


Figure 3 A hypothesis to explain how auxins stimulate cell elongation

The $H^+$ ions activate enzymes that break some of the hydrogen bonds cross-linking cellulose molecules in the wall. The cell then swells with water and elongates because its weakened wall no longer resists the cell's tendency to take up water osmotically. After this initial elongation, the cell sustains the growth by synthesizing more wall material and cytoplasm ⊖.

Auxins produce a number of other effects, in addition to stimulating cell elongation and causing stems and roots to lengthen. These hormones can also trigger the development of vascular tissues and induce cell division in the **vascular cambium**, thus promoting growth in stem diameter ⊖. Auxins are often used to promote initiation of root growth and are the active ingredient of the commercial preparations used in horticulture to root stem cuttings. They can also be used to promote uniform flowering, to promote fruit development, to inhibit lateral branching and leaf fall, and to prevent premature fruit drop ⊖. Some plants will even develop fruits without being fertilized if they are sprayed with auxin. Farmers sometimes produce tomatoes, cucumbers, and eggplants, for example, by spraying the plants with synthetic auxins and resulting in seedless fruits ⊖.

END OF TEXT

**Part of Think Aloud Protocol (Text B-Hormones)**
**Respondent 2 [VCD]**

| | **Protocol** | **Strategies in abbrev** | **Notes** | **FINAL strategy** |
|---|---|---|---|---|
| 1. | *Hormone and Signal Transduction* | | | |
| 2. | Hormone, hormone terbayang, saya terbayang hormon mestilah ia asal2 dia akan distimulate oleh otak untuk emmm menghasilkan hormone. [VCD: flipped pages of text] | | | |
| 3. | Teks ni agak banyak. Banyak. | | | |
| 4. | Saya akan start baca. | | | |
| 5. | *Hormones are signaling molecules synthesized and secret by endocrine gland and transported to their target cells via the bloodstream.* | | | |
| 6. | Apa yang saya faham dari ayat ni, hormone adalah signal, *hormones are signaling molecules synthesized*, ia disynthesize err dia disynthesize dan dirembeskan oleh endocrine gland, gland, kelenjar endocrine. | | | |
| 7. | Lepas tu dia akan ditransport untuk kepada bloodstream, dia akan di… | | | |
| 8. | Oh… err..bloodstream yang bawak hormone ni, dia akan pergi ke sel yang mana dia nak tuju yang mana akan bagi dia, yang akan, yang akan reflect, yang akan….., tindakbalas tu darah yang … bloodstream yang bawak hormone tu. | | | |
| 9. | *These mediators of cell function have a wide range of structures that include amino acid derivatives, small peptides, proteins, and steroids.* | | | |

**READING STRATEGY CODES AND SAMPLE TAP UNITS**

**M-Metacognitive Strategies Planning (MP)**

**HC-Higher cognitive strategies-Visualization**

| **Strategy CODE** | **Description of CODE** | **Sample TAP units from pilot study (those with asterisks (*) were created by researcher)** |
|---|---|---|
| HC-Vmap | Drawing mind map on paper to get the overall understanding of the text. | Auxin is extracted from natural auxins called IAA. [VCD: drew flow chart on types of auxins/ natural and synthetic on side of text] |

**HC-Higher cognitive strategies-Analyzing Visual Diagram (HCAVd)**

| **Strategy CODE** | **Description of CODE** | **Sample TAP units from pilot study (those with asterisks (*) were created by researcher)** |
|---|---|---|
| HCAVd-q | Questioning the function of each labelled items in diagram. | Where is the receptor? [VCD: looked for receptor in diagram] |

**HC-Higher cognitive strategies-Analyzing (HCA)**

| **Strategy CODE** | **Description of CODE** | **Sample TAP units from pilot study (those with asterisks (*) were created by researcher)** |
|---|---|---|
| HCA | Critically evaluating the information presented in the text based on what s/he knew about the topic. | If we look at… the appearance is like it is sunk/submerge in a different medium… Inside this, inside this cell, outside this cell…but it does not say that this is lipid. |

**HC-Higher cognitive strategies-Inferencing language (HCIL)**

| **Strategy CODE** | **Description of CODE** | **Sample TAP units from pilot study (those with asterisks (*) were created by researcher)** |
|---|---|---|
| HC-gues uknw | Guessing the meaning of unknown words or phrases. | Err… *penetrating*...I don't know *penetrating*, but I think *penetrating* is like it is going inside the plasma membrane… |

**HC-Higher cognitive strategies-Using Prior Knowledge (HCpk)**

| **Strategy CODE** | **Description of CODE** | **Sample TAP units from pilot study (those with asterisks (*) were created by researcher)** |
|---|---|---|
| HC-pk | Expending the points made in the text with own personal experience so that s/he understood the content of the text better. | I remember my dad also always uses auxin, auxin is expensive, so auxin extract must be mixed with some water before spraying it to thwe plant…with auxin, my dad does not have to use feritlizers… |

**LC-Lower cognitive strategies-Translating (LCT)**

| **Strategy CODE** | **Description of CODE** | **Sample TAP units from pilot study (those with asterisks (*) were created by researcher)** |
|---|---|---|
| LC-trans w | Translating the English words into one's native language. | *Swell* lembik *Swell* lembik |
| LC-trans p | Translating English phrases into one's native language. | *The given concentration…*this means maybe the concentration which is the same, perhaps…will give… |

**LC-Lower cognitive strategies-Questioning meaning of words/phrases (LCQ)**

| **Strategy CODE** | **Description of CODE** | **Sample TAP units from pilot study (those with asterisks (*) were created by researcher)** |
|---|---|---|
| LC-Qp<br>LC-Qs | Asking oneself the meanings of phrases/ sentences which s/he did not understand. | It says the hormone enters … *able to diffuse readily through the plasma membrane*.. Maknanya… Ini jalan apa? |

**LC-Lower cognitive strategies-Memorizing/Noting (LCMN)**

| **Strategy CODE** | **Description of CODE** | **Sample TAP units from pilot study (those with asterisks (*) were created by researcher)** |
|---|---|---|
| LC-undline/circle | Underlining or circling information in the text to help remember it. | *okay, extracellular binding of the hormone ….triggers a conformational change….inside the cytoplasm [VCD: underlining an d reading at the same time]. |

# SCIENTIFIC TEXT ACADEMIC READING STRATEGY INVENTORY
## Detailed Descriptions & Sample Protocols

**METACOGNITIVE STRATEGIES**

Metacognitive strategies are those steps related to self-management or self-regulation while one is reading a written text which include planning strategies and monitoring strategies. Metacognitive strategies during reading are those supervisory activities that manage and regulate cognitive processes during reading which may consist of the acts of previewing or over viewing tasks, solving problems, planning the next move looking at pictures before reading as well as checking, monitoring, testing and evaluating reader's comprehension and understanding of text.

1. **Metacognitive Strategy –Planning (MP)**

   The reader sets objective for reading the text or makes decisions about how he or she will read the text: Examples:

   a) "I have to be able to give a summary after I read this text" –setting a goal for reading the text.

   b) "I'll read this paragraph again to see if the writer says anything about the dogs" – making decisions about his/ her reading behaviours.

   c) "I'll read further to find out what that word means" – making decisions about his/ her reading behaviours.

2. **Metacognitive Strategy – Monitoring (MM)**

   The reader keeps tabs on his or her understanding of the text. Examples:

   a) "I don't understand that word/ sentence" – recognizing that there is a breakdown in comprehension.

   b) "What the writer says doesn't make sense" – recognizing that there is a breakdown in comprehension.

   c) "Yes, I understand that word/ sentence" – checking whether he or she understands part of the text.

d) “Yes, that’s what the writer said” – checking whether he or she understands part of the text.

**3. Metacognitive Strategy – Evaluating (ME)**

The reader evaluates his/ her reading processes (i.e, the way he/she reads the text) and/or the reading product (i.e, his/her mental representation of the text).

a) a) “No, it’s silly to spend too much time understanding the word” – evaluating his/her own reading behaviour.

b) “No, I don’t need to remember that” – evaluating his/her own reading behaviour.

c) I can’t understand many of the words in this text.” – evaluating his/her global understanding of the text.

d) “The words in this text are difficult” – evaluating the text or the reading task.

e) “The topic of this text is very interesting” – evaluating the text or the reading task.

**4. Metacognitive Strategy – Debugging (MD)**

The reader takes steps to fix/repair his/her reading problems.

a) “I’ll read this sentence again.” – fixing comprehension problem by rereading the sentence.

b) “I’ll read slowly so that I won’t get confused again.” – fixing comprehension problem by reading slowly.

c) “Oh? I’m confused now. I’ll stop for a while and try to imagine the process.” – fixing comprehension problem by running through the idea mentally.

d) “I still don’t understand. I will study the diagram to understand the text better.” – fixing reading problem by studying the diagram provided.

## HIGHER COGNITIVE STRATEGIES

Cognitive strategies are steps taken to get a global comprehension of the text read. These higher level strategies which are also known top down approach on reading are attempts that focus on synthesizing information from various sources in order to conceptualize the text content. Higher level cognitive strategies consist of actions such as relating new information to familiar concepts, making connections to background and content knowledge, making predictions and inferences based on both new and previous information, seeking clarification when the meaning of text is confusing, hypothesizing, and elaborating.

1. **HC-Summary**
   "The paragraph tells us that girls do better at school than boys."

2. **HC-Inference**
   "He was born in 1945 and started school in 1950. So he must have been five when he started school."

3. **HC-prediction/hypothesis**
   "This paragraph is going to be about cats."

4. **HC-Question content**
   "Animals are not needed in circus! But why not?

5. **HC-prior knowledge**
   "This text says –'boys are pushier than girls.'- oh yeah, like at lunch time in our school canteen."

6. **HC-prior knowledge of science**
   "I remember the topic I learned on DNA. It is made of enzymes and begins at specific points on the double helix."

7. **HC-personal response**
   "I don't agree with that."

## LOWER COGNITIVE STRATEGIES

Lower-level cognitive strategies are actions directed towards breaking the linguistic codes such as decoding and recognizing words, syntactic structures and parts of speech, and translating words and phrases.

1. **LC-Rereading** - reader rereads a portion of the text either aloud or silently.

   "A plasma membrane encloses the cytoplasm of the prokaryotic cell."

   "Saya ulang balik." – MD-rr

   "A plasma membrane encloses the cytoplasm of the prokaryotic cell."-LC-rr

2. **LC-Translating** - The reader translates words, phrases or sentences in the text from L2 to L1.

   "A *Mimosa* plant, for example, exhibits sleep movements at about the same interval even if kept in constant light or darkness."

   "Pokok Mimosa, sebagai contoh, memperlihatkan …" LC-trans s

3. **LC-paraphrasing**- The reader rephrases content using different words, keeping close to the original meaning.

   "A *Mimosa* plant, for example, exhibits sleep movements at about the same interval even if kept in constant light or darkness."

   "Mimosa plant's sleeping routine remains the same even though it receives continuous sunlight or is kept in total darkness."-LC-para

4. **LC-Questioning meaning of words/sentence**- The reader does not understand a particular word.

   "Flowering, seed germination, and the onset and ending of dormancy are examples of stages in plant development that usually occur at specific times of the year."

   "Dormancy-Dormancy tu apa?" – LC-Qw

"Apa makna ayat ni?" –LC-Qs

5. **LC-Splitting problematic sentence**-The reader breaks a sentence into smaller parts and process the meaning of each part.

"Flowering, seed germination, and the onset and ending of dormancy are examples of stages in plant development that usually occur at specific times of the year."

"Flowering, seed germination… "

*(avoid labelling this part as -LC-split prob sent- for now because the reader sometimes stops just to share his thoughts with the researcher)*

"Berbunga, percambahan benih.." – LC-trans ph

"and the onset and ending of dormancy…"

"dan permulaan dan akhir dormancy"- LC-trans ph

"are examples of stages in plant development…"

"contoh-contoh peringkat perkembangan pokok" –LC-trans ph

"that usually occur at specific times of the year." – LC- split prob sent

*(It is clear here that the reader did split the sentence in order to process each one in smaller chunks. This strategy is to be given only once for each sentence)*

**Think Aloud Protocol (Text B-Hormones & Signal Transduction)**
**Yusuf Majid : SAMPLE SCRIPT**

| | Protocol | Strategies in abbrev | Strategies in full/notes |
|---|---|---|---|
| 1. | (VCD-He flipped through the text ) | MP | MetacognitiveStrategies- Planning or previewing |
| 2. | *Hormones and signal transduction* | | |
| 3. | Saya macam tak pernah belajar lagi ni yang…tajuk ni. | HC-A | Higher Cognitive Strategies-Analysis-evaluating info in text with what he knew |
| 4. | Saya nak tengok ada 3 mukasurat, ada dua gambarajah… | MP | Metacognitive Strategies- Planning |
| 5. | *Hormones are signaling molecules synthesized and secreted by endocrine glands and transported to their target cells via the bloodstream.* | | |
| 6. | Okay, tadi saya bayangkan proses ni. | HC-Vmen | Higher Cognitive strategies-Visualizing-mentally |
| 7. | Endokrine merembes kan hormone dan masuk dalam saluran… | HC-VSum | Higher Cognitive strategies-Verbal Summarizing |
| 8. | *These mediators of cell function have a wide range of structures that include amino acid derivatives, small peptides, proteins, and steroids.* | | |
| 9. | Okay, ayat ni saya tak faham | MM-ack -ig | Metacognitive Strategies-monitoring-acknowledging ignorant |
| 10. | *These mediators of cell function have a wide range of structures that include amino acid derivatives, small peptides, proteins, and steroids.* | LC-rereading | |
| 11. | Okay, tadi saya cuba translate dalam b.m dan… | LC-transl s | Lower cognitive strategies-translate sentence (admission to translating even though not revealed in TAP) |

APPENDIX S

Table 5S1

Independent Samples T-test on L2 Proficiency between HP and LP learners

| | Mean | | t-test for Equality of Means | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | HP | LP | t | df | Sig. (2-tailed) | Mean Differn | Std. Error Differ | 95% Confidence Interval of the Difference | |
| | | | | | | | | Lower | Upper |
| English language (MUET) | 4.02 | 2.90 | -33.39 | 334 | .000 | -1.294 | .0388 | -1.370 | -1.218 |

**APPENDIX T**

Table 5T1

Pearson Correlations between Metacognitive Awareness and Specific **Reading Strategies (Text A)** among HP Learners in Three University Groupings

| | PQ/HP | | | R/HP | | | S/HP | | |
|---|---|---|---|---|---|---|---|---|---|
| | KNcog | REGcog | MAI | KNcog | REGcog | META | KNcog | REGcog | MAI |
| MC- Planning | .479** | .535** | .528** | .533** | .658** | .624** | .729** | .729** | .752** |
| MC-Monitoring | .536** | .660** | .621** | .594** | .780** | .720** | .706** | .791** | .774** |
| MC-Evaluating | .491** | .547** | .540** | .389* | .451** | .440** | .586** | .662** | .645** |
| MC-Debugging | .543** | .651** | .620** | .507* | .713** | .638** | .709** | .771** | .764** |
| HC-Visualizing | .461** | .406** | .455** | .211 | .471** | .355* | .746** | .697** | .744** |
| HC-Analyzing Visual Diagram | .513** | .467** | .513** | .565** | .720** | .674** | .722** | .660** | .712** |
| HC-Analyzing Text | .387** | .423** | .421** | .489** | .562** | .552** | .633** | .715** | .697** |
| HC-Inferring Language | .363** | .439** | .416** | .446** | .522** | .507** | .500** | .468** | .498** |
| HC-Inferring Content | .403** | .567** | .501** | .572** | .666** | .649** | .649** | .719** | .706** |
| HC-Accessing Prior Knowledge | .559** | .604** | .606** | .654** | .584** | .651** | .563** | .618** | .610** |
| HC-Summarizing | .427** | .515** | .489** | .399* | .578** | .512** | .560** | .534** | .564** |
| HC-Questioning content | .396** | .564** | .496** | .362* | .517** | .460** | .627** | .705** | .688** |
| HC-Reading for Global Understanding | .235 | .409** | .330* | .362* | .417** | .409** | .344 | .421* | .395* |

Table continues…

Table 5T1 (continued)

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| LC-Decoding | .424** | .433** | .448** | .516** | .580** | .575** | .355 | .497** | .441* |
| LC-Translating | .317* | .289* | .318* | .401* | .408** | .425** | .453* | .450* | .466** |
| LC-Questioning language | .310* | .423** | .379** | .292 | .521** | .425** | .617** | .580** | .617** |
| LC-Paraphrasing | .512** | .499** | .528** | .371* | .534** | .474** | .737** | .713** | .748** |
| LC-Memorizing & Taking Notes | .438** | .436** | .457** | .117 | .340* | .238 | .683** | .708** | .718** |
| LC-Reading for Local Understanding | .496** | .526** | .533** | .494** | .663** | .605** | .462** | .580** | .539** |

* Significant at the 0.05 level (2-tailed); ** Significant at the 0.01 level (2-tailed).

Table 5T2

Pearson Correlations between Metacognitive Awareness and Specific **Reading Strategies (Text B**) among HP Learners in Three University Groupings

| | PQ/HP | | | R/HP | | | S/HP | | |
|---|---|---|---|---|---|---|---|---|---|
| | KNcog | REGcog | MAI | KNcog | REGcog | META | KNcog | REGcog | MAI |
| MC- Planning | .556** | .545** | .576** | .617** | .791** | .738** | .649** | .687** | .690** |
| MC-Monitoring | .549** | .632** | .614** | .501** | .752** | .656** | .612** | .629** | .641** |
| MC-Evaluating | .575** | .568** | .597** | .514** | .658** | .614** | .640** | .702** | .693** |
| MC-Debugging | .595** | .597** | .623** | .459** | .677** | .594** | .654** | .659** | .678** |
| HC-Visualizing | .467** | .344* | .428** | .174 | .499** | .350* | .520** | .552** | .553** |
| HC-Analyzing Visual Diagram | .560** | .507** | .560** | .341* | .543** | .462** | .620** | .618** | .639** |
| HC-Analyzing Text | .543** | .635** | .612** | .399* | .627** | .537** | .532** | .584** | .576** |
| HC-Inferring Language | .287* | .437** | .374** | .381* | .475** | .448** | .476** | .385* | .443* |
| HC-Inferring Content | .578** | .663** | .645** | .477** | .699** | .616** | .659** | .705** | .705** |
| HC-Accessing Prior Knowledge | .512** | .472** | .515** | .608** | .736** | .705** | .567** | .566** | .585** |
| HC-Summarizing | .503** | .581** | .563** | .323* | .497** | .429** | .678** | .712** | .717** |
| HC-Questioning content | .480** | .602** | .561** | .380* | .601** | .512** | .553** | .622** | .607** |
| HC-Reading for Global Understanding | .105 | .258 | .184 | .249 | .318* | .297 | .311 | .438* | .388* |

Table continues…

Table 5T2 (continued)

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| LC-Decoding | .395** | .467** | .448** | .540** | .623** | .610(** | .433* | .563** | .517** |
| LC-Translating | .311* | .227 | .284* | .279 | .305 | .307 | .71 | .330 | .261 |
| LC-Questioning language | .467** | .564** | .535** | .365* | .514** | .461** | .552** | .479** | .531** |
| LC-Paraphrasing | .429** | .436** | .451** | .223 | .338* | .294 | .682** | .689** | .707** |
| LC-Memorizing & Taking Notes | .427** | .471** | .468** | .274 | .488** | .398* | .373* | .477** | .440* |
| LC-Reading for Local Understanding | .434** | .469** | .470** | .421** | .530** | .498** | .588** | .589** | .608** |

* Significant at the 0.05 level (2-tailed); ** Significant at the 0.01 level (2-tailed).

Table 5T3

Pearson Correlations between Metacognitive Awareness and Specific **Reading Strategies (Text A)** among LP Learners in Three University Groupings

| | PQ/HP | | | R/HP | | | S/HP | | |
|---|---|---|---|---|---|---|---|---|---|
| | KNcog | REGcog | MAI | KNcog | REGcog | META | KNcog | REGcog | MAI |
| MC- Planning | .479** | .619** | .565** | .507** | .629** | .574** | .513** | .541** | .539** |
| MC-Monitoring | .481** | .606** | .560** | .723** | .780** | .764** | .712** | .702** | .723** |
| MC-Evaluating | .393** | .576** | .497** | .356* | .484** | .423** | .550** | .585** | .580** |
| MC-Debugging | .476** | .601** | .555** | .592** | .695** | .652** | .604** | .588** | .609** |
| HC-Visualizing | .343** | .502** | .434** | .482** | .536** | .517** | .525** | .548** | .549** |
| HC-Analyzing Visual Diagram | .337** | .489** | .424** | .424** | .485** | .461** | .464** | .529** | .508** |
| HC-Analyzing Text | .351** | .512** | .443** | .670** | .685** | .691** | .701** | .672** | .702** |
| HC-Inferring Language | .391** | .464** | .441** | .314 | .437** | .377* | .566** | .602** | .597** |
| HC-Inferring Content | .536** | .659** | .615** | .705** | .745** | .737** | .601** | .617** | .623** |
| HC-Accessing Prior Knowledge | .451** | .585** | .533** | .697** | .771** | .745** | .662** | .651** | .671** |
| HC-Summarizing | .442** | .530** | .501** | .261 | .304 | .285 | .426** | .492** | .470** |
| HC-Questioning content | .448** | .564** | .521** | .606** | .618** | .624** | .596** | .615** | .619** |
| HC-Reading for Global Understanding | .282** | .368** | .335** | .397* | .434** | .422** | .268* | .233 | .256* |

Table continues…

Table 5T3 (continued)

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| LC-Decoding | .324** | .459** | .402** | .331* | .496** | .414* | .402** | .443** | .432** |
| LC-Translating | .317** | .401** | .370** | .208 | .235 | .224 | .365** | .431** | .407** |
| LC-Questioning language | .395** | .498** | .460** | .475** | .486** | .490** | .618** | .616** | .630** |
| LC-Paraphrasing | .388** | .535** | .475** | .536** | .649** | .599** | .523** | .593** | .571** |
| LC-Memorizing & Taking Notes | .437** | .566** | .517** | .397* | .456** | .432** | .595** | .580** | .601** |
| LC-Reading for Local Understanding | .384** | .531** | .471** | .179 | .230 | .206 | .585** | .645** | .629** |

* Significant at the 0.05 level (2-tailed)
** Significant at the 0.01 level (2-tailed).

Table 5T4

Pearson Correlations between Metacognitive Awareness and Specific **Reading Strategies (Text B)** among LP Learners in Three University Groupings

| | PQ/HP | | | R/HP | | | S/HP | | |
|---|---|---|---|---|---|---|---|---|---|
| | KNcog | REGcog | MAI | KNcog | REGcog | META | KNcog | REGcog | MAI |
| MC- Planning | .367** | .469** | .430** | .558** | .686** | .628** | .451** | .537** | .505** |
| MC-Monitoring | .423** | .561** | .506** | .591** | .640** | .625** | .629** | .662** | .660** |
| MC-Evaluating | .415** | .522** | .482** | .540** | .671** | .612** | .486** | .552** | .531** |
| MC-Debugging | .414** | .528** | .485** | .544** | .598** | .580** | .600** | .629** | .629** |
| HC-Visualizing | .328** | .453** | .401** | .539** | .614** | .584** | .400** | .460** | .441** |
| HC-Analyzing Visual Diagram | .273** | .413** | .352** | .524** | .597** | .568** | .461** | .566** | .526** |
| HC-Analyzing Text | .355** | .476** | .427** | .751** | .755** | .768** | .567** | .604** | .598** |
| HC-Inferring Language | .220* | .364** | .300** | .557** | .605** | .591** | .495** | .606** | .563** |
| HC-Inferring Content | .336** | .458** | .408** | .716** | .765** | .753** | .614** | .663** | .653** |
| HC-Accessing Prior Knowledge | .386** | .473** | .442** | .622** | .653** | .649** | .601** | .682** | .656** |
| HC-Summarizing | .406** | .534** | .484** | .476** | .524** | .507** | .379** | .407** | .402** |
| HC-Questioning content | .369** | .473** | .433** | .663** | .690** | .689** | .474** | .487** | .491** |
| HC-Reading for Global Understanding | .173 | .257** | .221* | .428** | .505** | .473** | .225 | .299* | .268* |

Table continues…

Table 5T4 (continued)

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| LC-Decoding | .278** | .443** | .370** | .516** | .616** | .573** | .463** | .493** | .489** |
| LC-Translating | .245* | .293** | .277** | .333* | .371* | .357* | .475** | .512** | .505** |
| LC-Questioning language | .419** | .560** | .503** | .527** | .566** | .555** | .590** | .642** | .630** |
| LC-Paraphrasing | .402** | .473** | .451** | .419** | .515** | .471** | .400** | .481** | .450** |
| LC-Memorizing & Taking Notes | .348** | .499** | .435** | .528** | .553** | .549** | .399** | .374** | .395** |
| LC-Reading for Local Understanding | .260** | .407** | .342** | .293 | .353* | .326* | .583** | .658** | .634** |

* Significant at the 0.05 level (2-tailed)
** Significant at the 0.01 level (2-tailed).

Table 5U1
Post Hoc LSD test for HP learners in Univ PQ, R, And S

| Dependent Variable | (I) Univ | (J) Univ | Mean Difference (I-J) | Std. Error | p-value | 95% Confidence Interval | |
|---|---|---|---|---|---|---|---|
| | | | | | | Lower Bound | Upper Bound |
| WS A | Univ PQ | Univ R | .4757 | 1.06 | 0.65 | -1.62 | 2.57 |
| | | Univ S | 5.3861(*) | 1.12 | 0.00 | 3.17 | 7.60 |
| | Univ R | Univ PQ | -.4757 | 1.06 | 0.65 | -2.57 | 1.62 |
| | | Univ S | 4.9104(*) | 1.18 | 0.00 | 2.57 | 7.25 |
| | Univ S | Univ PQ | -5.3861(*) | 1.12 | 0.00 | -7.60 | -3.17 |
| | | Univ R | -4.9104(*) | 1.18 | 0.00 | -7.25 | -2.57 |
| RCA | Univ PQ | Univ R | -.6423 | 1.51 | 0.67 | -3.64 | 2.36 |
| | | Univ S | 6.4236(*) | 1.61 | 0.00 | 3.25 | 9.60 |
| | Univ R | Univ PQ | .6423 | 1.51 | 0.67 | -2.36 | 3.64 |
| | | Univ S | 7.0659(*) | 1.69 | 0.00 | 3.72 | 10.41 |
| | Univ S | Univ PQ | -6.4236(*) | 1.61 | 0.00 | -9.60 | -3.25 |
| | | Univ R | -7.0659(*) | 1.69 | 0.00 | -10.41 | -3.72 |
| WS B | Univ PQ | Univ R | 1.7004(*) | 0.81 | 0.04 | 0.09 | 3.31 |
| | | Univ S | 2.9587(*) | 0.86 | 0.00 | 1.25 | 4.66 |
| | Univ R | Univ PQ | -1.7004(*) | 0.81 | 0.04 | -3.31 | -0.09 |
| | | Univ S | 1.2583 | 0.91 | 0.17 | -0.54 | 3.06 |
| | Univ S | Univ PQ | -2.9587(*) | 0.86 | 0.00 | -4.66 | -1.25 |
| | | Univ R | -1.2583 | 0.91 | 0.17 | -3.06 | 0.54 |
| RCB | Univ PQ | Univ R | 1.3404 | 1.24 | 0.28 | -1.12 | 3.80 |
| | | Univ S | 6.4737(*) | 1.31 | 0.00 | 3.87 | 9.08 |
| | Univ R | Univ PQ | -1.3404 | 1.24 | 0.28 | -3.80 | 1.12 |
| | | Univ S | 5.1333(*) | 1.38 | 0.00 | 2.39 | 7.88 |
| | Univ S | Univ PQ | -6.4737(*) | 1.31 | 0.00 | -9.08 | -3.87 |
| | | Univ R | -5.1333(*) | 1.38 | 0.00 | -7.88 | -2.39 |
| RC AB | Univ PQ | Univ R | .6982 | 2.38 | 0.77 | -4.01 | 5.41 |
| | | Univ S | 12.8973(*) | 2.52 | 0.00 | 7.90 | 17.89 |
| | Univ R | Univ PQ | -.6982 | 2.38 | 0.77 | -5.41 | 4.01 |
| | | Univ S | 12.1992(*) | 2.66 | 0.00 | 6.94 | 17.46 |
| | Univ S | Univ PQ | -12.8973(*) | 2.52 | 0.00 | -17.89 | -7.90 |
| | | Univ R | -12.1992(*) | 2.66 | 0.00 | -17.46 | -6.94 |

Based on observed means.
* The mean difference is significant at the .05 level.

Table 5U2
Post Hoc LSD test for LP learners in Univ PQ, R, and S

| Dependent Variable | (I) Univ | (J) Univ | Mean Difference (I-J) | Std. Error | p-value | 95% Confidence Interval | |
|---|---|---|---|---|---|---|---|
| | | | | | | Lower Bound | Upper Bound |
| WS A | Univ PQ | Univ R | 3.1173(*) | 1.09 | 0.01 | 0.97 | 5.27 |
| | | Univ S | 2.4878(*) | 0.87 | 0.01 | 0.77 | 4.21 |
| | Univ R | Univ PQ | -3.1173(*) | 1.09 | 0.01 | -5.27 | -0.97 |
| | | Univ S | -.6295 | 1.16 | 0.59 | -2.91 | 1.65 |
| | Univ S | Univ PQ | -2.4878(*) | 0.87 | 0.01 | -4.21 | -0.77 |
| | | Univ R | .6295 | 1.16 | 0.59 | -1.65 | 2.91 |
| RCA | Univ PQ | Univ R | 2.2901 | 1.39 | 0.10 | -0.44 | 5.02 |
| | | Univ S | 2.9072(*) | 1.11 | 0.01 | 0.72 | 5.09 |
| | Univ R | Univ PQ | -2.2901 | 1.39 | 0.10 | -5.02 | 0.44 |
| | | Univ S | .6171 | 1.47 | 0.68 | -2.28 | 3.51 |
| | Univ S | Univ PQ | -2.9072(*) | 1.11 | 0.01 | -5.09 | -0.72 |
| | | Univ R | -.6171 | 1.47 | 0.68 | -3.51 | 2.28 |
| WSB | Univ PQ | Univ R | 1.7889(*) | 0.84 | 0.04 | 0.13 | 3.45 |
| | | Univ S | 1.5625(*) | 0.67 | 0.02 | 0.23 | 2.89 |
| | Univ R | Univ PQ | -1.7889(*) | 0.84 | 0.04 | -3.45 | -0.13 |
| | | Univ S | -.2264 | 0.89 | 0.80 | -1.99 | 1.54 |
| | Univ S | Univ PQ | -1.5625(*) | 0.67 | 0.02 | -2.89 | -0.23 |
| | | Univ R | .2264 | 0.89 | 0.80 | -1.54 | 1.99 |
| RCB | Univ PQ | Univ R | 3.3923(*) | 1.14 | 0.00 | 1.14 | 5.64 |
| | | Univ S | 2.4457(*) | 0.91 | 0.01 | 0.65 | 4.24 |
| | Univ R | Univ PQ | -3.3923(*) | 1.14 | 0.00 | -5.64 | -1.14 |
| | | Univ S | -.9465 | 1.21 | 0.44 | -3.33 | 1.44 |
| | Univ S | Univ PQ | -2.4457(*) | 0.91 | 0.01 | -4.24 | -0.65 |
| | | Univ R | .9465 | 1.21 | 0.44 | -1.44 | 3.33 |
| RC AB | Univ PQ | Univ R | 5.6824(*) | 2.14 | 0.01 | 1.47 | 9.90 |
| | | Univ S | 5.3530(*) | 1.71 | 0.00 | 1.98 | 8.72 |
| | Univ R | Univ PQ | -5.6824(*) | 2.14 | 0.01 | -9.90 | -1.47 |
| | | Univ S | -.3294 | 2.27 | 0.89 | -4.80 | 4.14 |
| | Univ S | Univ PQ | -5.3530(*) | 1.71 | 0.00 | -8.72 | -1.98 |
| | | Univ R | .3294 | 2.27 | 0.89 | -4.14 | 4.80 |

Based on observed means.
* The mean difference is significant at the .05 level.

Table 5U3
MANOVA for Metacognition Scores in HP and LP Learners in Univ PQ, R and S

| Source | Dependent Variable | df | *F* | *p* |
|---|---|---|---|---|
| Univ PQ/HP ; Univ PQ/LP; Univ R/HP; Univ R/LP; Univ S/HP; Univ S/LP | WSA | 5 | 8.38 | .000 |
| | RCA | 5 | 10.46 | .000 |
| | WSB | 5 | 4.46 | .001 |
| | RCB | 5 | 12.07 | .000 |
| | RC AB | 5 | 15.09 | .000 |

Table 5U4
Post Hoc LSD test for LP learners in Univ PQ, R, and S

| Dependent Variable | (I) UnivHP/LP | (J) UnivHP/LP | Mean Difference (I-J) | Std. Error | p-value | 95% Confidence Interval | |
|---|---|---|---|---|---|---|---|
| | | | | | | Lower Bound | Upper Bound |
| WS A | Univ PQ LP | Univ PQ HP | -1.7419 | 0.92 | 0.06 | -3.56 | 0.07 |
| | | Univ R LP | 3.1173(*) | 1.05 | 0.00 | 1.06 | 5.18 |
| | | Univ R HP | -1.2662 | 1.01 | 0.21 | -3.25 | 0.71 |
| | | Univ S LP | 2.4878(*) | 0.84 | 0.00 | 0.84 | 4.14 |
| | | Univ S HP | 3.6443(*) | 1.08 | 0.00 | 1.51 | 5.78 |
| | Univ PQ HP | Univ PQ LP | 1.7419 | 0.92 | 0.06 | -0.07 | 3.56 |
| | | Univ R LP | 4.8591(*) | 1.18 | 0.00 | 2.54 | 7.17 |
| | | Univ R HP | .4757 | 1.14 | 0.68 | -1.77 | 2.72 |
| | | Univ S LP | 4.2296(*) | 0.99 | 0.00 | 2.27 | 6.19 |
| | | Univ S HP | 5.3861(*) | 1.21 | 0.00 | 3.01 | 7.76 |
| | Univ R LP | Univ PQ LP | -3.1173(*) | 1.05 | 0.00 | -5.18 | -1.06 |
| | | Univ PQ HP | -4.8591(*) | 1.18 | 0.00 | -7.17 | -2.54 |
| | | Univ R HP | -4.3835(*) | 1.24 | 0.00 | -6.83 | -1.94 |
| | | Univ S LP | -.6295 | 1.11 | 0.57 | -2.81 | 1.56 |
| | | Univ S HP | .5270 | 1.31 | 0.69 | -2.04 | 3.10 |
| | Univ R HP | Univ PQ LP | 1.2662 | 1.01 | 0.21 | -0.71 | 3.25 |
| | | Univ PQ HP | -.4757 | 1.14 | 0.68 | -2.72 | 1.77 |
| | | Univ R LP | 4.3835(*) | 1.24 | 0.00 | 1.94 | 6.83 |
| | | Univ S LP | 3.7539(*) | 1.07 | 0.00 | 1.64 | 5.86 |
| | | Univ S HP | 4.9104(*) | 1.27 | 0.00 | 2.40 | 7.42 |
| | Univ S LP | Univ PQ LP | -2.4878(*) | 0.84 | 0.00 | -4.14 | -0.84 |
| | | Univ PQ HP | -4.2296(*) | 0.99 | 0.00 | -6.19 | -2.27 |
| | | Univ R LP | .6295 | 1.11 | 0.57 | -1.56 | 2.81 |
| | | Univ R HP | -3.7539(*) | 1.07 | 0.00 | -5.86 | -1.64 |
| | | Univ S HP | 1.1565 | 1.14 | 0.31 | -1.10 | 3.41 |
| | Univ S HP | Univ PQ LP | -3.6443(*) | 1.08 | 0.00 | -5.78 | -1.51 |
| | | Univ PQ HP | -5.3861(*) | 1.21 | 0.00 | -7.76 | -3.01 |
| | | Univ R LP | -.5270 | 1.31 | 0.69 | -3.10 | 2.04 |
| | | Univ R HP | -4.9104(*) | 1.27 | 0.00 | -7.42 | -2.40 |
| | | Univ S LP | -1.1565 | 1.14 | 0.31 | -3.41 | 1.10 |

Based on observed means.
* The mean difference is significant at the .05 level.

Table continues…

Table 5U4 (continued)
Post Hoc LSD test for LP learners in Univ PQ, R, and S

| Dependent Variable | (I) UnivHP/LP | (J) UnivHP/LP | Mean Difference (I-J) | Std. Error | p-value | 95% Confidence Interval | |
|---|---|---|---|---|---|---|---|
| | | | | | | Lower Bound | Upper Bound |
| RCA | Univ PQ LP | Univ PQ HP | -4.0547(*) | 1.22 | 0.00 | -6.46 | -1.65 |
| | | Univ R LP | 2.2901 | 1.39 | 0.10 | -0.44 | 5.02 |
| | | Univ R HP | -4.6970(*) | 1.33 | 0.00 | -7.32 | -2.07 |
| | | Univ S LP | 2.9072(*) | 1.11 | 0.01 | 0.72 | 5.09 |
| | | Univ S HP | 2.3689 | 1.43 | 0.10 | -0.45 | 5.19 |
| | Univ PQ HP | Univ PQ LP | 4.0547(*) | 1.22 | 0.00 | 1.65 | 6.46 |
| | | Univ R LP | 6.3449(*) | 1.56 | 0.00 | 3.28 | 9.41 |
| | | Univ R HP | -.6423 | 1.51 | 0.67 | -3.62 | 2.33 |
| | | Univ S LP | 6.9620(*) | 1.32 | 0.00 | 4.37 | 9.55 |
| | | Univ S HP | 6.4236(*) | 1.60 | 0.00 | 3.27 | 9.57 |
| | Univ R LP | Univ PQ LP | -2.2901 | 1.39 | 0.10 | -5.02 | 0.44 |
| | | Univ PQ HP | -6.3449(*) | 1.56 | 0.00 | -9.41 | -3.28 |
| | | Univ R HP | -6.9871(*) | 1.65 | 0.00 | -10.23 | -3.75 |
| | | Univ S LP | .6171 | 1.47 | 0.68 | -2.28 | 3.51 |
| | | Univ S HP | .0788 | 1.73 | 0.96 | -3.32 | 3.48 |
| | Univ R HP | Univ PQ LP | 4.6970(*) | 1.33 | 0.00 | 2.07 | 7.32 |
| | | Univ PQ HP | .6423 | 1.51 | 0.67 | -2.33 | 3.62 |
| | | Univ R LP | 6.9871(*) | 1.65 | 0.00 | 3.75 | 10.23 |
| | | Univ S LP | 7.6042(*) | 1.42 | 0.00 | 4.81 | 10.40 |
| | | Univ S HP | 7.0659(*) | 1.69 | 0.00 | 3.75 | 10.38 |
| | Univ S LP | Univ PQ LP | -2.9072(*) | 1.11 | 0.01 | -5.09 | -0.72 |
| | | Univ PQ HP | -6.9620(*) | 1.32 | 0.00 | -9.55 | -4.37 |
| | | Univ R LP | -.6171 | 1.47 | 0.68 | -3.51 | 2.28 |
| | | Univ R HP | -7.6042(*) | 1.42 | 0.00 | -10.40 | -4.81 |
| | | Univ S HP | -.5383 | 1.52 | 0.72 | -3.52 | 2.44 |
| | Univ S HP | Univ PQ LP | -2.3689 | 1.43 | 0.10 | -5.19 | 0.45 |
| | | Univ PQ HP | -6.4236(*) | 1.60 | 0.00 | -9.57 | -3.27 |
| | | Univ R LP | -.0788 | 1.73 | 0.96 | -3.48 | 3.32 |
| | | Univ R HP | -7.0659(*) | 1.69 | 0.00 | -10.38 | -3.75 |
| | | Univ S LP | .5383 | 1.52 | 0.72 | -2.44 | 3.52 |
| WSB | Univ PQ LP | Univ PQ HP | -1.3840 | 0.71 | 0.05 | -2.79 | 0.02 |
| | | Univ R LP | 1.7889(*) | 0.81 | 0.03 | 0.20 | 3.38 |
| | | Univ R HP | .3164 | 0.78 | 0.68 | -1.21 | 1.85 |
| | | Univ S LP | 1.5625(*) | 0.65 | 0.02 | 0.29 | 2.83 |
| | | Univ S HP | 1.5747 | 0.84 | 0.06 | -0.07 | 3.22 |
| | Univ PQ HP | Univ PQ LP | 1.3840 | 0.71 | 0.05 | -0.02 | 2.79 |
| | | Univ R LP | 3.1729(*) | 0.91 | 0.00 | 1.39 | 4.96 |
| | | Univ R HP | 1.7004 | 0.88 | 0.05 | -0.03 | 3.43 |
| | | Univ S LP | 2.9465(*) | 0.77 | 0.00 | 1.44 | 4.46 |
| | | Univ S HP | 2.9587(*) | 0.93 | 0.00 | 1.12 | 4.79 |

Based on observed means.
* The mean difference is significant at the .05 level.

Table continues…

Table 5U4 (continued)
Post Hoc LSD test for LP learners in Univ PQ, R, and S

| Dependent Variable | (I) UnivHP/LP | (J) UnivHP/LP | Mean Difference (I-J) | Std. Error | p-value | 95% Confidence Interval | |
|---|---|---|---|---|---|---|---|
| | | | | | | Lower Bound | Upper Bound |
| WSB | Univ R LP | Univ PQ LP | -1.7889(*) | 0.81 | 0.03 | -3.38 | -0.20 |
| | | Univ PQ HP | -3.1729(*) | 0.91 | 0.00 | -4.96 | -1.39 |
| | | Univ R HP | -1.4724 | 0.96 | 0.13 | -3.36 | 0.42 |
| | | Univ S LP | -.2264 | 0.86 | 0.79 | -1.91 | 1.46 |
| | | Univ S HP | -.2142 | 1.01 | 0.83 | -2.20 | 1.77 |
| | Univ R HP | Univ PQ LP | -.3164 | 0.78 | 0.68 | -1.85 | 1.21 |
| | | Univ PQ HP | -1.7004 | 0.88 | 0.05 | -3.43 | 0.03 |
| | | Univ R LP | 1.4724 | 0.96 | 0.13 | -0.42 | 3.36 |
| | | Univ S LP | 1.2461 | 0.83 | 0.13 | -0.38 | 2.87 |
| | | Univ S HP | 1.2583 | 0.98 | 0.20 | -0.68 | 3.19 |
| | Univ S LP | Univ PQ LP | -1.5625(*) | 0.65 | 0.02 | -2.83 | -0.29 |
| | | Univ PQ HP | -2.9465(*) | 0.77 | 0.00 | -4.46 | -1.44 |
| | | Univ R LP | .2264 | 0.86 | 0.79 | -1.46 | 1.91 |
| | | Univ R HP | -1.2461 | 0.83 | 0.13 | -2.87 | 0.38 |
| | | Univ S HP | .0122 | 0.88 | 0.99 | -1.73 | 1.75 |
| | Univ S HP | Univ PQ LP | -1.5747 | 0.84 | 0.06 | -3.22 | 0.07 |
| | | Univ PQ HP | -2.9587(*) | 0.93 | 0.00 | -4.79 | -1.12 |
| | | Univ R LP | .2142 | 1.01 | 0.83 | -1.77 | 2.20 |
| | | Univ R HP | -1.2583 | 0.98 | 0.20 | -3.19 | 0.68 |
| | | Univ S LP | -.0122 | 0.88 | 0.99 | -1.75 | 1.73 |
| RCB | Univ PQ LP | Univ PQ HP | -3.9349(*) | 1.00 | 0.00 | -5.91 | -1.96 |
| | | Univ R LP | 3.3923(*) | 1.14 | 0.00 | 1.15 | 5.63 |
| | | Univ R HP | -2.5945(*) | 1.10 | 0.02 | -4.75 | -0.44 |
| | | Univ S LP | 2.4457(*) | 0.91 | 0.01 | 0.65 | 4.24 |
| | | Univ S HP | 2.5388(*) | 1.18 | 0.03 | 0.22 | 4.86 |
| | Univ PQ HP | Univ PQ LP | 3.9349(*) | 1.00 | 0.00 | 1.96 | 5.91 |
| | | Univ R LP | 7.3271(*) | 1.28 | 0.00 | 4.81 | 9.85 |
| | | Univ R HP | 1.3404 | 1.24 | 0.28 | -1.10 | 3.78 |
| | | Univ S LP | 6.3806(*) | 1.08 | 0.00 | 4.25 | 8.51 |
| | | Univ S HP | 6.4737(*) | 1.32 | 0.00 | 3.89 | 9.06 |
| | Univ R LP | Univ PQ LP | -3.3923(*) | 1.14 | 0.00 | -5.63 | -1.15 |
| | | Univ PQ HP | -7.3271(*) | 1.28 | 0.00 | -9.85 | -4.81 |
| | | Univ R HP | -5.9867(*) | 1.35 | 0.00 | -8.65 | -3.33 |
| | | Univ S LP | -.9465 | 1.21 | 0.43 | -3.32 | 1.43 |
| | | Univ S HP | -.8535 | 1.42 | 0.55 | -3.65 | 1.94 |
| | Univ R HP | Univ PQ LP | 2.5945(*) | 1.10 | 0.02 | 0.44 | 4.75 |
| | | Univ PQ HP | -1.3404 | 1.24 | 0.28 | -3.78 | 1.10 |
| | | Univ R LP | 5.9867(*) | 1.35 | 0.00 | 3.33 | 8.65 |
| | | Univ S LP | 5.0402(*) | 1.17 | 0.00 | 2.74 | 7.34 |
| | | Univ S HP | 5.1333(*) | 1.39 | 0.00 | 2.41 | 7.86 |

Based on observed means.
* The mean difference is significant at the .05 level.

Table continues…

Table 5U4 (continued)
Post Hoc LSD test for LP learners in Univ PQ, R, and S

| Dependent Variable | (I) UnivHP/LP | (J) UnivHP/LP | Mean Difference (I-J) | Std. Error | p-value | 95% Confidence Interval | |
|---|---|---|---|---|---|---|---|
| | | | | | | Lower Bound | Upper Bound |
| RCB | Univ S LP | Univ PQ LP | -2.4457(*) | 0.91 | 0.01 | -4.24 | -0.65 |
| | | Univ PQ HP | -6.3806(*) | 1.08 | 0.00 | -8.51 | -4.25 |
| | | Univ R LP | .9465 | 1.21 | 0.43 | -1.43 | 3.32 |
| | | Univ R HP | -5.0402(*) | 1.17 | 0.00 | -7.34 | -2.74 |
| | | Univ S HP | .0931 | 1.25 | 0.94 | -2.36 | 2.54 |
| | Univ S HP | Univ PQ LP | -2.5388(*) | 1.18 | 0.03 | -4.86 | -0.22 |
| | | Univ PQ HP | -6.4737(*) | 1.32 | 0.00 | -9.06 | -3.89 |
| | | Univ R LP | .8535 | 1.42 | 0.55 | -1.94 | 3.65 |
| | | Univ R HP | -5.1333(*) | 1.39 | 0.00 | -7.86 | -2.41 |
| | | Univ S LP | -.0931 | 1.25 | 0.94 | -2.54 | 2.36 |
| RC AB | Univ PQ LP | Univ PQ HP | -7.9896(*) | 1.90 | 0.00 | -11.73 | -4.25 |
| | | Univ R LP | 5.6824(*) | 2.16 | 0.01 | 1.44 | 9.92 |
| | | Univ R HP | -7.2915(*) | 2.07 | 0.00 | -11.37 | -3.22 |
| | | Univ S LP | 5.3530(*) | 1.72 | 0.00 | 1.96 | 8.74 |
| | | Univ S HP | 4.9077(*) | 2.23 | 0.03 | 0.52 | 9.29 |
| | Univ PQ HP | Univ PQ LP | 7.9896(*) | 1.90 | 0.00 | 4.25 | 11.73 |
| | | Univ R LP | 13.6720(*) | 2.42 | 0.00 | 8.91 | 18.44 |
| | | Univ R HP | .6982 | 2.35 | 0.77 | -3.92 | 5.32 |
| | | Univ S LP | 13.3426(*) | 2.05 | 0.00 | 9.32 | 17.37 |
| | | Univ S HP | 12.8973(*) | 2.49 | 0.00 | 8.00 | 17.79 |
| | Univ R LP | Univ PQ LP | -5.6824(*) | 2.16 | 0.01 | -9.92 | -1.44 |
| | | Univ PQ HP | -13.6720(*) | 2.42 | 0.00 | -18.44 | -8.91 |
| | | Univ R HP | -12.9738(*) | 2.56 | 0.00 | -18.01 | -7.94 |
| | | Univ S LP | -.3294 | 2.29 | 0.89 | -4.83 | 4.17 |
| | | Univ S HP | -.7747 | 2.69 | 0.77 | -6.06 | 4.51 |
| | Univ R HP | Univ PQ LP | 7.2915(*) | 2.07 | 0.00 | 3.22 | 11.37 |
| | | Univ PQ HP | -.6982 | 2.35 | 0.77 | -5.32 | 3.92 |
| | | Univ R LP | 12.9738(*) | 2.56 | 0.00 | 7.94 | 18.01 |
| | | Univ S LP | 12.6444(*) | 2.21 | 0.00 | 8.30 | 16.99 |
| | | Univ S HP | 12.1992(*) | 2.62 | 0.00 | 7.04 | 17.36 |
| | Univ S LP | Univ PQ LP | -5.3530(*) | 1.72 | 0.00 | -8.74 | -1.96 |
| | | Univ PQ HP | -13.3426(*) | 2.05 | 0.00 | -17.37 | -9.32 |
| | | Univ R LP | .3294 | 2.29 | 0.89 | -4.17 | 4.83 |
| | | Univ R HP | -12.6444(*) | 2.21 | 0.00 | -16.99 | -8.30 |
| | | Univ S HP | -.4453 | 2.36 | 0.85 | -5.08 | 4.19 |
| | Univ S HP | Univ PQ LP | -4.9077(*) | 2.23 | 0.03 | -9.29 | -0.52 |
| | | Univ PQ HP | -12.8973(*) | 2.49 | 0.00 | -17.79 | -8.00 |
| | | Univ R LP | .7747 | 2.69 | 0.77 | -4.51 | 6.06 |
| | | Univ R HP | -12.1992(*) | 2.62 | 0.00 | -17.36 | -7.04 |
| | | Univ S LP | .4453 | 2.36 | 0.85 | -4.19 | 5.08 |

Based on observed means.
* The mean difference is significant at the .05 level.

Table 5V1

Mean of Each SPK Sub Category Possessed by ESL Learners in Univ PQ, R and S

| | Category/ subcategory | Univ PQ (N=157) | | Univ R (N=76) | | Univ S (N=103) | | | | MANOVA |
|---|---|---|---|---|---|---|---|---|---|---|
| No | (Full Mark) | Mean *(%)* | SD | Mean *(%)* | SD | Mean *(%)* | SD | *df* | *F* | *p* |
| 1a | SPK on Plant Hormone (4) | 2.09 *(52.3)* | .97 | 2.47 *(61.8)* | .81 | 2.03 *(50.8)* | .81 | 2 | 6.30 | .002* |
| 1b | SPK on charactrstc of Auxins (21) | 6.50 *(31)* | 3.06 | 7.51 *(35.8)* | 2.51 | 7.33 *(34.9)* | 2.83 | 2 | 4.23 | .015* |
| 1c | SPK Biochemical process of Cell Elongation (10) | 2.66 *(26.6)* | 1.58 | 2.97 *(29.7)* | 1.62 | 3.05 *(30.5)* | 1.77 | 2 | 2.05 | .130 |
| 1d | SPK Scientific Term in Text A (5) | 1.85 *(37)* | 0.93 | 2.46 *(49.2)* | 1.20 | 2.13 *(42.6)* | 1.08 | 2 | 8.82 | .000* |
| 2a | SPK on Human Hormone (7) | 3.30 *(47.1)* | 1.41 | 3.51 *(50.1)* | 1.11 | 3.37 *(48.1)* | 1.89 | 2 | .711 | .492 |
| 2b | SPK on charactrstc of Human Hormone (12) | 2.92 *(24.3)* | 1.86 | 3.41 *(28.4)* | 1.49 | 3.04 *(25.3)* | 1.59 | 2 | 2.14 | .119 |
| 2c | SPK Biochemical process of Signal Trans (12) | 3.15 *(26.3)* | 2.17 | 4.14 *(34.5)* | 2.41 | 3.53 *(29.4)* | 2.55 | 2 | 4.59 | .011* |
| 2d | SPK Scientific Terminology in Text B (9) | 3.95 *(43.9)* | 1.58 | 4.53 *(50.3)* | 1.53 | 3.52 *(39.1)* | 1.45 | 2 | 9.42 | .000* |

*Significant main effect

Table 5V2

Post-Hoc Tests for SPKI and its Subcategories in Univ PQ, R and S (LSD test)

| Dependent Variable | (I) Univ grouping | (J) Univ grouping | Mean Difference (I-J) | Std. Error | p-value | 95% Confidence Interval | |
|---|---|---|---|---|---|---|---|
| | | | | | | Lower Bound | Upper Bound |
| SPKI | Univ PQ | Univ R | -4.57(*) | 1.15 | 0.00 | -6.84 | -2.33 |
| | | Univ S | -1.57 | 1.04 | 0.13 | -3.62 | 0.48 |
| | Univ R | Univ PQ | 4.57(*) | 1.15 | 0.00 | 2.33 | 6.84 |
| | | Univ S | 3.01(*) | 1.24 | 0.02 | 0.57 | 5.46 |
| | Univ S | Univ PQ | 1.57 | 1.04 | 0.13 | -0.48 | 3.62 |
| | | Univ R | -3.01(*) | 1.24 | 0.02 | -5.46 | -0.57 |
| (1) SPK A | Univ PQ | Univ R | -2.31(*) | 0.62 | 0.00 | -3.53 | -1.09 |
| | | Univ S | -1.43(*) | 0.56 | 0.01 | -2.53 | -0.32 |
| | Univ R | Univ PQ | 2.31(*) | 0.62 | 0.00 | 1.09 | 3.53 |
| | | Univ S | 0.89 | 0.67 | 0.19 | -0.43 | 2.21 |
| | Univ S | Univ PQ | 1.43(*) | 0.56 | 0.01 | 0.32 | 2.53 |
| | | Univ R | -0.89 | 0.67 | 0.19 | -2.21 | 0.43 |
| (2) SPK B | Univ PQ | Univ R | -2.27(*) | 1.15 | 0.00 | -6.84 | -2.33 |
| | | Univ S | -0.15 | 1.04 | 0.13 | -3.62 | 0.48 |
| | Univ R | Univ PQ | 2.27(*) | 1.15 | 0.00 | 2.33 | 6.84 |
| | | Univ S | 2.13(*) | 1.24 | 0.02 | 0.57 | 5.46 |
| | Univ S | Univ PQ | .15 | 1.04 | 0.13 | -0.48 | 3.62 |
| | | Univ R | -2.13(*) | 1.24 | 0.02 | -5.46 | -0.57 |
| (3) SPK on | Univ PQ | Univ R | -1.12(*) | 0.62 | 0.00 | -3.53 | -1.09 |
| Scientific | | Univ S | 0.22 | 0.56 | 0.01 | -2.53 | -0.32 |
| Term | Univ R | Univ PQ | 1.12(*) | 0.62 | 0.00 | 1.09 | 3.53 |
| | | Univ S | 1.34(*) | 0.67 | 0.19 | -0.43 | 2.21 |
| | Univ S | Univ PQ | -0.22 | 0.56 | 0.01 | 0.32 | 2.53 |
| | | Univ R | -1.34(*) | 0.67 | 0.19 | -2.21 | 0.43 |

Table continues…

Table 5V2 (Continued)

| Dependent Variable | (I) Univ grouping | (J) Univ grouping | Mean Difference (I-J) | Std. Error | p-value | 95% Confidence Interval | |
|---|---|---|---|---|---|---|---|
| | | | | | | Lower Bound | Upper Bound |
| (1a) SPK on | Univ PQ | Univ R | -0.38(*) | 0.12 | 0.00 | -0.62 | -0.13 |
| Plant | | Univ S | 0.07 | 0.11 | 0.56 | -0.15 | 0.29 |
| Hormone | Univ R | Univ PQ | 0.38(*) | 0.12 | 0.00 | 0.13 | 0.62 |
| | | Univ S | 0.44(*) | 0.13 | 0.00 | 0.18 | 0.71 |
| | Univ S | Univ PQ | -0.07 | 0.11 | 0.56 | -0.29 | 0.15 |
| | | Univ R | -0.44(*) | 0.13 | 0.00 | -0.71 | -0.18 |
| (1b) SPK on | Univ PQ | Univ R | -1.01(*) | 0.40 | 0.01 | -1.80 | -0.22 |
| Charactrstc of | | Univ S | -0.83(*) | 0.36 | 0.02 | -1.54 | -0.11 |
| Auxins | Univ R | Univ PQ | 1.01(*) | 0.40 | 0.01 | 0.22 | 1.80 |
| | | Univ S | 0.18 | 0.43 | 0.67 | -0.67 | 1.04 |
| | Univ S | Univ PQ | 0.83(*) | 0.36 | 0.02 | 0.11 | 1.54 |
| | | Univ R | -0.18 | 0.43 | 0.67 | -1.04 | 0.67 |
| (1d) SPK | Univ PQ | Univ R | -0.61(*) | 0.15 | 0.00 | -0.89 | -0.32 |
| Scientific | | Univ S | -0.27(*) | 0.13 | 0.04 | -0.53 | -0.01 |
| Term | Univ R | Univ PQ | 0.61(*) | 0.15 | 0.00 | 0.32 | 0.89 |
| in Text A | | Univ S | 0.33(*) | 0.16 | 0.04 | 0.02 | 0.65 |
| | Univ S | Univ PQ | 0.27(*) | 0.13 | 0.04 | 0.01 | 0.53 |
| | | Univ R | -0.33(*) | 0.16 | 0.04 | -0.65 | -0.02 |
| (2c) SPK | Univ PQ | Univ R | -0.99(*) | 0.33 | 0.00 | -1.64 | -0.35 |
| Biochemical | | Univ S | -0.38 | 0.30 | 0.20 | -0.97 | 0.20 |
| Process of | Univ R | Univ PQ | 0.99(*) | 0.33 | 0.00 | 0.35 | 1.64 |
| Signal | | Univ S | 0.61 | 0.36 | 0.09 | -0.09 | 1.31 |
| Transduction | Univ S | Univ PQ | 0.38 | 0.30 | 0.20 | -0.20 | 0.97 |
| | | Univ R | -0.61 | 0.36 | 0.09 | -1.31 | 0.09 |
| (2d) SPK | Univ PQ | Univ R | -0.58(*) | 0.64 | 0.00 | -3.62 | -1.08 |
| Scientific | | Univ S | 0.42(*) | 0.58 | 0.69 | -1.39 | 0.91 |
| Term | Univ R | Univ PQ | 0.58(*) | 0.64 | 0.00 | 1.08 | 3.62 |
| in Text B | | Univ S | 1.00(*) | 0.70 | 0.00 | 0.74 | 3.48 |
| | Univ S | Univ PQ | -0.42(*) | 0.58 | 0.69 | -0.91 | 1.39 |
| | | Univ R | -1.00(*) | 0.70 | 0.00 | -3.48 | -0.74 |

*$p < 0.05$

Table 5V3

Post Hoc LSD test on SPK of HP learners in Univ PQ, R, S

| Dependent Variable | (I) L2 Proficiency | (J) L2 Proficiency | Mean Difference (I-J) | Std. Error | p-value | 95% Confidence Interval | |
|---|---|---|---|---|---|---|---|
| | | | | | | Lower Bound | Upper Bound |
| SPK | Univ PQ | Univ R | -.7862 | 0.48 | 0.10 | -1.73 | 0.16 |
| Scientific | | Univ S | .5784 | 0.51 | 0.26 | -0.43 | 1.58 |
| Term | Univ R | Univ PQ | .7862 | 0.48 | 0.10 | -0.16 | 1.73 |
| | | Univ S | 1.3646* | 0.54 | 0.01 | 0.29 | 2.44 |
| | Univ S | Univ PQ | -.5784 | 0.51 | 0.26 | -1.58 | 0.43 |
| | | Univ R | -1.3646* | 0.54 | 0.01 | -2.44 | -0.29 |

* The mean difference is significant at the .05 level.

Table 5V4

Post Hoc LSD test on SPK of LP learners in Univ PQ, R, S

| Dependent Variable | (I) L2 Proficiency | (J) L2 Proficiency | Mean Difference (I-J) | Std. Error | p-value | 95% Confidence Interval | |
|---|---|---|---|---|---|---|---|
| | | | | | | Lower Bound | Upper Bound |
| SPKI | Univ PQ | Univ R | -6.49(*) | 1.52 | 0.00 | -9.49 | -3.48 |
| | | Univ S | -2.75(*) | 1.23 | 0.03 | -5.17 | -0.33 |
| | Univ R | Univ PQ | 6.49(*) | 1.52 | 0.00 | 3.48 | 9.49 |
| | | Univ S | 3.74(*) | 1.61 | 0.02 | 0.56 | 6.92 |
| | Univ S | Univ PQ | 2.75(*) | 1.23 | 0.03 | 0.33 | 5.17 |
| | | Univ R | -3.74(*) | 1.61 | 0.02 | -6.92 | -0.56 |
| SPK A | Univ PQ | Univ R | -3.50(*) | 1.52 | 0.00 | -9.49 | -3.48 |
| | | Univ S | -1.76(*) | 1.23 | 0.03 | -5.17 | -0.33 |
| | Univ R | Univ PQ | 3.5(*) | 1.52 | 0.00 | 3.48 | 9.49 |
| | | Univ S | 1.75 | 1.61 | 0.02 | 0.56 | 6.92 |
| | Univ S | Univ PQ | 1.76(*) | 1.23 | 0.03 | 0.33 | 5.17 |
| | | Univ R | -1.75 | 1.61 | 0.02 | -6.92 | -0.56 |
| SPK B | Univ PQ | Univ R | -2.98(*) | 1.52 | 0.00 | -9.49 | -3.48 |
| | | Univ S | -.99 | 1.23 | 0.03 | -5.17 | -0.33 |
| | Univ R | Univ PQ | 2.98(*) | 1.52 | 0.00 | 3.48 | 9.49 |
| | | Univ S | 1.99(*) | 1.61 | 0.02 | 0.56 | 6.92 |
| | Univ S | Univ PQ | .99 | 1.23 | 0.03 | 0.33 | 5.17 |
| | | Univ R | -1.99(*) | 1.61 | 0.02 | -6.92 | -0.56 |
| SPKI Scientific Term | Univ PQ | Univ R | -1.10(*) | 1.52 | 0.00 | -9.49 | -3.48 |
| | | Univ S | .01 | 1.23 | 0.03 | -5.17 | -0.33 |
| | Univ R | Univ PQ | 1.10(*) | 1.52 | 0.00 | 3.48 | 9.49 |
| | | Univ S | 1.11(*) | 1.61 | 0.02 | 0.56 | 6.92 |
| | Univ S | Univ PQ | -.01 | 1.23 | 0.03 | 0.33 | 5.17 |
| | | Univ R | -1.11(*) | 0.39 | 0.01 | -1.89 | -0.34 |

* The mean difference is significant at the .05 level.Table 5V5

Table 5V5

Tests of Between-Subjects Effects

| Source | Dependent Variable | Type III Sum of Squares | df | F | Sig. | Partial Eta Squared |
|---|---|---|---|---|---|---|
| Univ | SPKI | 2102.897 | 5 | 6.47 | 0.00 | 0.09 |
| HPLP | SPK A | 535.329 | 5 | 5.57 | 0.00 | 0.08 |
| groups | SPK B | 610.567 | 5 | 5.84 | 0.00 | 0.08 |
| | SPK SciTerm | 139.858 | 5 | 6.52 | 0.00 | 0.09 |

Table 5W1

Post-hoc LSD test for LC strategies across four L2 proficiency groups

| Dependent Variable | (I) L2 Proficiency | (J) L2 Proficiency | Mean Difference (I-J) | Std. Error | p-value | 95% Confidence Interval | |
|---|---|---|---|---|---|---|---|
| | | | | | | Lower Bound | Upper Bound |
| LC | Limited L2 | Modest L2 | -.26 | 0.20 | 0.20 | -0.65 | 0.14 |
| (Text A) | | Competent L2 | -.08 | 0.21 | 0.70 | -0.49 | 0.33 |
| | | Good L2 | .55(*) | 0.27 | 0.04 | 0.02 | 1.08 |
| | Modest L2 | Limited L2 | .26 | 0.20 | 0.20 | -0.14 | 0.65 |
| | | Competent L2 | .18 | 0.11 | 0.11 | -0.04 | 0.40 |
| | | Good L2 | .81(*) | 0.20 | 0.00 | 0.41 | 1.20 |
| | Competent | Limited L2 | .08 | 0.21 | 0.70 | -0.33 | 0.49 |
| | L2 | Modest L2 | -.18 | 0.11 | 0.11 | -0.40 | 0.04 |
| | | Good L2 | .63(*) | 0.21 | 0.00 | 0.22 | 1.04 |
| | Good L2 | Limited L2 | -.55(*) | 0.27 | 0.04 | -1.08 | -0.02 |
| | | Modest L2 | -.81(*) | 0.20 | 0.00 | -1.20 | -0.41 |
| | | Competent L2 | -.63(*) | 0.21 | 0.00 | -1.04 | -0.22 |
| LC | Limited L2 | Modest L2 | -.41(*) | 0.20 | 0.04 | -0.80 | -0.02 |
| (Text B) | | Competent L2 | -.20 | 0.21 | 0.34 | -0.61 | 0.21 |
| | | Good L2 | .26 | 0.26 | 0.32 | -0.26 | 0.78 |
| | Modest L2 | Limited L2 | .41(*) | 0.20 | 0.04 | 0.02 | 0.80 |
| | | Competent L2 | .21 | 0.11 | 0.06 | -0.01 | 0.42 |
| | | Good L2 | .67(*) | 0.20 | 0.00 | 0.28 | 1.06 |
| | Competent | Limited L2 | .20 | 0.21 | 0.34 | -0.21 | 0.61 |
| | L2 | Modest L2 | -.21 | 0.11 | 0.06 | -0.42 | 0.01 |
| | | Good L2 | .46(*) | 0.21 | 0.03 | 0.06 | 0.87 |
| | Good L2 | Limited L2 | -.26 | 0.26 | 0.32 | -0.78 | 0.26 |
| | | Modest L2 | -.67(*) | 0.20 | 0.00 | -1.06 | -0.28 |
| | | Competent L2 | -.46(*) | 0.21 | 0.03 | -0.87 | -0.06 |

* Significant mean difference at $p < 0.05$

Table 5W2

Post Hoc Test for Three Measures of Reading Comprehension

| Dependent Variable | (I) L2 Proficiency | (J) L2 Proficiency | Mean Difference (I-J) | Std. Error | p-value | 95% Confidence Interval | |
|---|---|---|---|---|---|---|---|
| | | | | | | Lower Bound | Upper Bound |
| Written | Limited L2 | Modest L2 | -.36 | 1.23 | 0.77 | -2.78 | 2.06 |
| Summary | | Competent L2 | -1.23 | 1.29 | 0.34 | -3.77 | 1.30 |
| A | | Good L2 | -4.49* | 1.64 | 0.01 | -7.71 | -1.26 |
| | Modest L2 | Limited L2 | .36 | 1.23 | 0.77 | -2.06 | 2.78 |
| | | Competent L2 | -.87 | 0.70 | 0.21 | -2.24 | 0.50 |
| | | Good L2 | -4.12* | 1.23 | 0.00 | -6.54 | -1.70 |
| | Competent | Limited L2 | 1.23 | 1.29 | 0.34 | -1.30 | 3.77 |
| | L2 | Modest L2 | .87 | 0.70 | 0.21 | -0.50 | 2.24 |
| | | Good L2 | -3.25* | 1.29 | 0.01 | -5.79 | -0.72 |
| | Good L2 | Limited L2 | 4.49* | 1.64 | 0.01 | 1.26 | 7.71 |
| | | Modest L2 | 4.12* | 1.23 | 0.00 | 1.70 | 6.54 |
| | | Competent L2 | 3.25* | 1.29 | 0.01 | 0.72 | 5.79 |
| RCA | Limited L2 | Modest L2 | -1.03 | 1.59 | 0.52 | -4.16 | 2.09 |
| | | Competent L2 | -3.55* | 1.66 | 0.03 | -6.82 | -0.28 |
| | | Good L2 | -10.36* | 2.12 | 0.00 | -14.52 | -6.19 |
| | Modest L2 | Limited L2 | 1.03 | 1.59 | 0.52 | -2.09 | 4.16 |
| | | Competent L2 | -2.51* | 0.90 | 0.01 | -4.28 | -0.74 |
| | | Good L2 | -9.32* | 1.59 | 0.00 | -12.45 | -6.20 |
| | Competent | Limited L2 | 3.55* | 1.66 | 0.03 | 0.28 | 6.82 |
| | L2 | Modest L2 | 2.51* | 0.90 | 0.01 | 0.74 | 4.28 |
| | | Good L2 | -6.81* | 1.66 | 0.00 | -10.08 | -3.54 |
| | Good L2 | Limited L2 | 10.36* | 2.12 | 0.00 | 6.19 | 14.52 |
| | | Modest L2 | 9.32* | 1.59 | 0.00 | 6.20 | 12.45 |
| | | Competent L2 | 6.81* | 1.66 | 0.00 | 3.54 | 10.08 |

Table continues…

Table 5W2 (Continued)

| Dependent Variable | (I) L2 Proficiency | (J) L2 Proficiency | Mean Difference (I-J) | Std. Error | p-value | 95% Confidence Interval Lower Bound | Upper Bound |
|---|---|---|---|---|---|---|---|
| Written | Limited L2 | Modest user | -1.33 | 0.93 | 0.15 | -3.16 | *0.50* |
| Summary | | Competent user | -1.81 | 0.97 | 0.06 | -3.73 | *0.10* |
| B | | Good user | -3.11* | 1.24 | 0.01 | -5.55 | *-0.67* |
| | Modest L2 | Limited user | 1.33 | 0.93 | 0.15 | -0.50 | *3.16* |
| | | Competent user | -0.49 | 0.53 | 0.36 | -1.52 | *0.55* |
| | | Good user | -1.78 | 0.93 | 0.06 | -3.61 | *0.05* |
| | Competent | Limited user | 1.81 | 0.97 | 0.06 | -0.10 | *3.73* |
| | L2 | Modest user | 0.49 | 0.53 | 0.36 | -0.55 | *1.52* |
| | | Good user | -1.29 | 0.97 | 0.19 | -3.21 | *0.62* |
| | Good L2 | Limited user | 3.11* | 1.24 | 0.01 | 0.67 | *5.55* |
| | | Modest user | 1.78 | 0.93 | 0.06 | -0.05 | *3.61* |
| | | Competent user | 1.29 | 0.97 | 0.19 | -0.62 | 3.21 |
| RCB | Limited L2 | Modest L2 | -2.80* | 1.33 | 0.04 | -5.40 | -0.19 |
| | | Competent L2 | -4.82* | 1.39 | 0.00 | -7.55 | -2.09 |
| | | Good L2 | -9.28* | 1.77 | 0.00 | -12.75 | -5.81 |
| | Modest L2 | Limited L2 | 2.80* | 1.33 | 0.04 | 0.19 | 5.40 |
| | | Competent L2 | -2.02* | 0.75 | 0.01 | -3.50 | -0.55 |
| | | Good L2 | -6.49* | 1.33 | 0.00 | -9.09 | -3.88 |
| | Competent | Limited L2 | 4.82* | 1.39 | 0.00 | 2.09 | 7.55 |
| | L2 | Modest L2 | 2.02* | 0.75 | 0.01 | 0.55 | 3.50 |
| | | Good L2 | -4.46* | 1.39 | 0.00 | -7.19 | -1.73 |
| | Good L2 | Limited L2 | 9.28* | 1.77 | 0.00 | 5.81 | 12.75 |
| | | Modest L2 | 6.49* | 1.33 | 0.00 | 3.88 | 9.09 |
| | | Competent L2 | 4.46* | 1.39 | 0.00 | 1.73 | 7.19 |

* Significant mean difference at $p < 0.05$

APPENDIX X

Table 5X1

Independent T-Tests on Strategies Used to Read Scientific Text A Between HP Good and LP Good Readers

| | t | df | Sig. (2-tailed) | Mean Differn | Std. Error Differ | 95% Confidence Interval of the Difference | |
|---|---|---|---|---|---|---|---|
| | | | | | | Lower | Upper |
| MC-Planning | 2.285 | 91 | .025* | 0.42 | 0.19 | 0.06 | 0.79 |
| MC-Monitoring | .308 | 91 | .759 | 0.05 | 0.17 | -0.29 | 0.40 |
| MC-Evaluating | 1.231 | 91 | .222 | 0.25 | 0.21 | -0.16 | 0.66 |
| MC-Debugging | 1.187 | 91 | .238 | 0.21 | 0.18 | -0.14 | 0.57 |
| HC-Visualizing | -.037 | 91 | .971 | -0.01 | 0.22 | -0.44 | 0.43 |
| HC-Analyzing Visual Diagram | .409 | 91 | .683 | 0.08 | 0.20 | -0.32 | 0.48 |
| HC-Analyzing Text | -.249 | 91 | .804 | -0.06 | 0.23 | -0.51 | 0.40 |
| HC-Inferring Language | .915 | 91 | .363 | 0.21 | 0.23 | -0.25 | 0.68 |
| HC-Inferring Content | 3.008 | 91 | .003* | 0.59 | 0.19 | 0.20 | 0.97 |
| HC-Accessing Prior Knowledge | .555 | 91 | .580 | 0.10 | 0.18 | -0.25 | 0.45 |
| HC-Summarizing | 2.026 | 91 | .046* | 0.46 | 0.23 | 0.01 | 0.91 |
| HC-Questioning content | 1.306 | 91 | .195 | 0.29 | 0.22 | -0.15 | 0.74 |
| HC-Reading for Global Understanding | 1.208 | 91 | .230 | 0.25 | 0.21 | -0.16 | 0.66 |
| LC-Decoding | 2.301 | 91 | .024* | 0.51 | 0.22 | 0.07 | 0.95 |
| LC-Translating | 4.179 | 91 | .000* | 1.17 | 0.28 | 0.61 | 1.72 |
| LC-Questioning language | 1.795 | 91 | .076 | 0.41 | 0.23 | -0.04 | 0.85 |
| LC-Paraphrasing | 1.398 | 91 | .166 | 0.34 | 0.25 | -0.15 | 0.83 |
| LC-Memorizing & Taking Notes | 1.336 | 91 | .185 | 0.27 | 0.20 | -0.13 | 0.66 |
| LC-Reading for Local Understanding | .682 | 91 | .497 | 0.14 | 0.20 | -0.26 | 0.53 |

*$p < 0.05$

Table 5X2
Independent T-Tests on Strategies Used to Read Scientific Text B Between HP Good and LP Good Readers

| | t | df | Sig. (2-tailed) | Mean Differn | Std. Error Differ | 95% Confidence Interval of the Difference | |
|---|---|---|---|---|---|---|---|
| | | | | | | Lower | Upper |
| MC-Planning | 1.761 | 91 | .082 | 0.36 | 0.20 | -0.05 | 0.76 |
| MC-Monitoring | .121 | 91 | .904 | 0.02 | 0.17 | -0.31 | 0.35 |
| MC-Evaluating | .896 | 91 | .372 | 0.18 | 0.20 | -0.21 | 0.57 |
| MC-Debugging | 1.515 | 91 | .133 | 0.28 | 0.19 | -0.09 | 0.66 |
| HC-Visualizing | -.310 | 91 | .757 | -0.07 | 0.23 | -0.54 | 0.39 |
| HC-Analyzing Visual Diagram | -.220 | 91 | .826 | -0.04 | 0.20 | -0.44 | 0.35 |
| HC-Analyzing Text | -.193 | 91 | .847 | -0.04 | 0.22 | -0.48 | 0.40 |
| HC-Inferring Language | .067 | 91 | .946 | 0.01 | 0.21 | -0.40 | 0.43 |
| HC-Inferring Content | 2.157 | 91 | .034* | 0.41 | 0.19 | 0.03 | 0.79 |
| HC-Accessing Prior Knowledge | 1.437 | 91 | .154 | 0.28 | 0.20 | -0.11 | 0.67 |
| HC-Summarizing* | .949 | 91 | .345 | 0.22 | 0.23 | -0.24 | 0.68 |
| HC-Questioning content | 1.236 | 91 | .220 | 0.28 | 0.22 | -0.17 | 0.72 |
| HC-Reading for Global Understanding | 1.338 | 91 | .184 | 0.30 | 0.22 | -0.14 | 0.73 |
| LC-Decoding | 2.572 | 91 | .012* | 0.59 | 0.23 | 0.13 | 1.05 |
| LC-Translating | 3.495 | 91 | .001* | 0.97 | 0.28 | 0.42 | 1.52 |
| LC-Questioning language | .406 | 91 | .685 | 0.09 | 0.21 | -0.33 | 0.50 |
| LC-Paraphrasing | 2.288 | 91 | .024* | 0.54 | 0.24 | 0.07 | 1.00 |
| LC-Memorizing & Taking Notes | .725 | 91 | .470 | 0.17 | 0.23 | -0.29 | 0.62 |
| LC-Reading for Local Understanding | .316 | 91 | .752 | 0.06 | 0.20 | -0.34 | 0.47 |

*$p < 0.05$