European Journal of Education Studies
ISSN: 2501 - 1111
ISSN-L: 2501 - 1111
Available on-line at: www.oapub.org/edu

doi: 10.5281/zenodo.1210013 Volume 4 | Issue 4 | 2018

A JOURNEY FROM IB PRIMARY YEARS PROGRAMME TO MIDDLE YEARS PROGRAMME: TRANSITION AND ALIGNMENT IN THE SCIENCE CONTEXT

Mary Jane R. Buniel[1], Ravichandran[2i]
[1]PYP Coordinator,
Fairview International School, Malaysia
[2]Dr., Dean of Post Graduate Studies,
University College Fairview, Malaysia

Abstract:
In International Baccalaureate programme, the transition from the Primary Years Programme to Middle Years Programme is associated with various complex challenges which often results in poor science academic performance of middle year students. These challenges can be attributed from more than one area, such as from students, teachers and from curriculum perspective. To reduce the challenges, transition strategies were designed and piloted such as the demonstration and experimentation. The demonstration helped to align the students understanding of some scientific terminologies while the experimentation was conducted to introduce the simplified lab report design that provided the students with basic knowledge on the experimental processes in the Middle Years and guided the students on the consistent use of the Modern Language Association format of referencing. This article evaluates various transition strategies which were found effective to aid the middle year students during the transition stage.

Keywords: transition, student challenge, teacher challenge, curriculum challenge

1. Introduction

Science in the Primary Years Programme is not an isolated subject but rather should be learned in the context of the programme of inquiry (IBO, 2009). It is clearly explained in the IB document, Making the PYP Happen that, "*It is recognized that teaching and learning science as a subject, while necessary, is not sufficient. It is important that science is learned through context, exploring content relevant to students and transcending the boundaries of the traditional subject area. The transdisciplinary themes provide the framework for a highly defined,*

[i] Correspondence: email ravichandran.ucf@fairview.edu.my

focused, in-depth programme of inquiry, and as science is relevant to all the transdisciplinary themes, all planned science learning should take place within this framework" (IBO, 2009:4). However, when Grade 6 students move up to Grade 7, Middle Years Programme, the Primary Years transdisciplinary theme of teaching and learning is shifted to Middle Years interdisciplinary teaching and learning, from inquiry-based teaching in the Primary Years to a more concept-based and in-depth content-based teaching in the Middle Years. Due to the differences between the two programmes, the students and teachers experienced some challenges. In the case of, Interdisciplinary learning in the Middle Years, it is the process by which students come to understand bodies of knowledge and modes of thinking from two or more disciplines or subject groups and integrate them to create a new understanding. It is a central feature of the Middle Years Programme curriculum and should be visible in teachers' units of work, student work and assessment criteria (IBO, 2011:13). Hence, the difference in the approaches to teaching and learning between Primary Years Programme and Middle Years Programme, as well as the language use in the two programmes, suggest transition challenges considering the depth and breadth of students' learning and understanding of science.

1.2 Background

The study focuses on an international school in Malaysia offering a full continuum programme from the Primary Years Programme, Middle Years Programme and Diploma Programme. In the past 2 years, poor laboratory skills, essay writing and referencing skills are identified as the challenges to an extent of 66% for the middle year Grade 7 students based on the interviews with the coordinators and science teachers and student surveys. These skills are required to satisfy the middle year science criteria which are not thoroughly assessed in the Primary Years due to the differences in the nature of the programme and assessment practices. The claims were further investigated and validated by interviewing the former primary year students and scrutinizing their results in science in Grade 7. This study aims to make an attempt to find out the challenges that an International School experiences causing poor results in the student academic performance in science. The findings assisted the researcher in designing and piloting the transition strategies to reduce the identified challenges during transition.

2. Literature Review

Transition according to Evangelou et al. (2008) is defined as the movement of students and adjustment phase from primary to secondary school. *"Research has shown that the primary-secondary transition is a crucial and often problematic period." (Humprey & Ainscow, 2006:320).* It is very significant but a neglected topic (Topping, 2011). *"It can be a challenge for many schools, teachers and students." (De Arroyo, 2011:39).* Thus, we see a clear area of concern for the students and teachers.

It is during this crucial phase of compulsory education that many pupils are at risk of becoming marginalized and disaffected (Humprey & Ainscow, 2006) and considered as one of the most difficult in pupils' educational career (Zeedyk et al., 2003). Transition should not be neglected (Topping, 2011) and should be given attention in order to aid students during the transition year. As this is critical, Hanewald (2013) suggested that well designed and implemented transition approaches can assist in the process of supporting students. Therefore, it is necessary to plan and design transition approaches that would address the challenges during the transition years. Various schools identified different transition challenges. In this study, the transition of students from primary years to middle years was associated with varying needs and many challenges. As such, De Arroyo's (2011) perspective of considering the uniqueness and needs of the school in designing transition strategies was a very important factor that was considered in this study to design the science transition strategies.

2.1 Student Challenges: Social and Academic

In order to investigate the challenges in science during the transition year, the perspectives of various researchers were taken into consideration. For example, regardless of the subject area, the social and academic factors were claimed to be the categories of the challenges according to Mackinzie, McMaugh and O'Sullivan (2012), Humprey and Ainscow (2006), Zeedyk (2003) and Hanewald (2013). The categories were considered in collecting data before designing and trialing the science transition strategies.

In International Baccalaureate Schools, skill is an essential element of the curriculum (IBO, 2012) in all three programmes – primary, middle years (secondary) and diploma. The skills, including social skills are represented by the Approaches to Learning. Social skills in the primary years are taught and learnt across all subject areas and are extended in the middle years into a more sophisticated cluster i.e. collaboration (IBO, 2014). This implies that International Baccalaureate Schools provide opportunity for social skill development among students and this is naturally embedded into the primary years and middle years programme curriculum framework which is unique from other non-International Baccalaureate schools.

Academic challenges are brought by the greater emphasis being placed on evaluation or grading of students according to Benner & Graham, Anderson, et al. and Wigfield, et al. (Mackinzie, McMaugh and O'Sullivan, 2012). Parents in an Asian country like China consider scores to be the only evaluating criteria for the students (Kirkpatrick, 2011). For this reason, the study scrutinized the academic results in science which was found to be the student challenge in the transition year.

The investigation of the academic results of the Grade 7 middle year students led to the discovery of more detailed academic problems associated during the transition period. Transition period, according to the Northern Territory Council of Government School Organization is associated with a substantial decline in academic performance (Mackinzie, McMaugh and O'Sullivan, 2012). This is because it involves stresses and anxiety for all pupils, even those who adjust well to secondary school (Mackinzie,

McMaugh and O'Sullivan, 2012). The poor academic performance in science of the middle year Grade 7 students substantiated this claim. The researcher considered this claim in piloting the science transition strategies particularly the demonstration and experimentation.

2.2 Teacher Challenges

Topping (2011) explains that challenges during transition were due to the delivery of the curriculum in secondary school. He described the secondary style of learning as an individualized style as opposed with the primary style which was a group style. Teaching approaches were shifted from child-centred, activity-based or experiential learning in primary to a more didactic approach in secondary (Topping, 2011). Topping (2011) stressed out that challenges during transition were attributed to teachers' ability to motivate students, the quality of teaching science and the delivery of the secondary school curriculum.

Another challenge mentioned in the paper was the problem in understanding science and technology of 60% of the primary teachers. 30% of them need good deal of help. In addition, some teachers lacked the investigation skills to teach the students which were similar in the case of the international school in this project. Primary year teachers were not able to conduct the experiment due to their lack of understanding and skills to do it. This has impact on the students' achievement in science. Many secondary science teachers feel that pupils must be introduced to working in a lab (Burr and Simpson, 2006), like the case in this project to help the students during transition.

2.3 Curriculum Challenges

"In IB schools, transition between PYP and MYP is associated with the challenges brought by the changes in the curriculum approaches." (De Arroyo, 2011:39). In the context of the school in this research, transition involves moving from a transdisciplinary approach to learning of the primary years to an Interdisciplinary approach to learning of the middle years. This change creates a gap between the two programmes in various aspects and leads into many challenges during the transition year. The gap resulted in a decrease in the academic results of the students in Bogota, Columbia in some subjects like English, Math and Science (De Arroyo, 2012).

3. Statement of the Problem

The students experienced poor academic results in science during the transition year due to the differences in the nature of the two programmes. Researchers such as Topping (2011) and Arroyo (2011) explained that this transition period should not be neglected. The school should design transition strategies to address the identified challenges.

3.1 Research Questions

The two main research questions that emerged from the aims of this study are as follows:

1. What are the causes of middle year students' **poor laboratory skills**, **poor essay writing in science** and **poor referencing skills?**
2. How effective are the following science transition strategies to address the identified student challenges?

It is important to note that well-designed and implemented transition approaches can assist in the process of supporting students during transition (Hanewald, 2013). The science transition strategies would serve as a pilot programme to establish an annual science transition programme that addresses the issues in the transition years.

3.2 Research Methodology

Although, the research involved both quantitative and qualitative methods, this article, largely focuses on the qualitative aspect of the study that were used to capture the perception of the coordinators, science teachers and students. The feedback from the coordinator and science teachers through interview, along with the assessment results of students in science provided a clear direction of taking this research to explore the specific challenges of the students during the transition year.

The Piggot-Irvine Model was used as a research design for this action research. Refer to the model below:

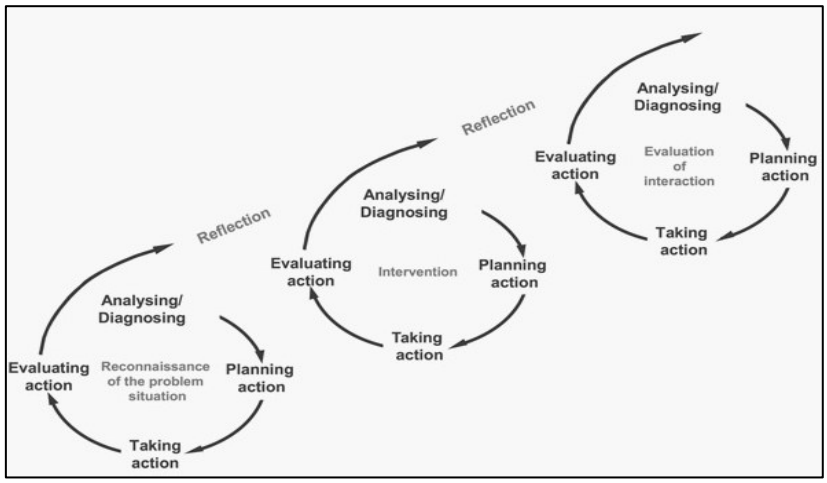

Figure 1: The Piggot-Irvine Model
(Source: Adapted from Coghlan and Brannick (2001))

3.3 Research Instrument/ Population and Sampling Technique

The data collection method used in cycle 1 were interview of the PYP coordinator and middle year science teachers to examine the existing situation, Grade 7 student survey is used to validate the claims of the coordinator and science teachers. The researcher also obtained the science results of middle year students in 2014 to determine the criteria with poor results.

In cycle 2, the proposed transition strategies were carried out using a focus group in the primary years. These transition strategies are the demonstration, experimentation using the simplified lab report design and mentoring to introduce the Modern Language Association format of referencing.

In cycle 3, Know-Want-Learn chart, student reflection and Grade 6 teachers' feedback were used to analyse the effectiveness of demonstration and mentoring. The score of 14 students in the lab report were used for quantitative data analysis of the lab report using the 8-point maximum scores.

3.4 Data Analysis

Based on students input in the Know-Want-Learn chart, the student reflection demonstrated evidence of understanding some scientific terminologies and skills such as prediction, hypothesis, recording of data, variables and conclusion.

In the results of the lab report, the students obtained an average score of 3.8 in criteria B: Inquiring and Designing and 2.4 in Criteria C: Processing and Evaluating. The results demonstrated that students were weak at prediction which means that students were challenged in writing hypothesis with scientific reasoning.

The induction and mentoring also revealed the students understanding of the significance of the Modern Language Association format of referencing in their research as written in the students' reflection.

4. Discussion and Findings

Cycle1: Collecting Information

From the interviews and academic results

According to Teachers P, C and M, poor understanding or transfer of scientific knowledge into writing was considered to be the reason for students' poor essay writing, the content knowledge was moderate explained by Teacher P, but, the students were not able to use the knowledge appropriately in writing essays. Teacher D highlighted that another problem was the students' poor command in English. Both Teacher D and M explained that poor referencing skills were accounted to the absence of the Modern Language Association format of referencing in the Primary Years. Referencing was also very important in writing essays. Teacher P, C and M stated that students were very weak in laboratory skills. This was attributed to the lack of exposure to experimentation of the Grade 6 students as observed by Teacher D and C. Poor laboratory skills refer to the ability of the students to design an experiment, to write hypothesis and to manipulate variables. Basically, it implied that the students were poor in conducting experiment and writing a lab report which were not introduced in the Primary Years.

Teachers were also asked about the difference between the Grade 6 and Grade 7 science content. According to Teacher P, the content was very brief; Teacher C mentioned that the content of Grade 6 inquiry units was similar to Grade 9's but just providing the students with basic and superficial understanding. Teacher D explained

that Primary Years were learning the basic and Middle Years were learning in-depth content.

The teachers had also various feedbacks on how teaching and learning in science was taking place in both Primary Year and Middle Year. Teacher D described science learning in Primary Years as more fun learning while Teacher D stated that Grade 7 did a lot of experiment practice. Teacher C observed the use of inquiry approach to develop questioning skills among the Grade 6 students; however, Teacher P emphasized the problem on lack of opportunity to conduct experiment due to the facility issue.

The absence of the lab report in Primary Years, the teachers and students understanding of experimentation, lack of exposure to referencing and the way science was taught in PYP were explained by Teachers P, C, D and M as the causes of poor laboratory skills. In addition, the assessment criteria in the Primary Years did not match with that of the Middle Years and therefore were not able to see if there was similarity or difference in the way they conducted the assessment tasks in the Primary. Teacher P, C and D claimed that they had not seen any science assessment task neither science assessment criteria used in the Primary Years.

Table 1: Assessment result

Grade 7: Science Assessment Result		
Criteria A	:	4.5
Criteria B	:	3.0
Criteria C	:	3.0
Criteria D	:	3.4
Average : 3.5		

The science marks of the 87 old Primary Years students ascertained poor results in Criteria B: Inquiring and Designing, Criterion C: Processing and Evaluating and Criterion D: Reflecting on the Impact of Science. These students scored 3 out of 8 in criteria B and C. The assessment task required for these criteria (B, C and D) was a lab report where students need to apply their laboratory skills such as writing hypothesis, testing the hypothesis, experimenting and drawing conclusions with proper citations. Students obtained 3.4 out of 8 in criteria D in which the students were required to write essay reflection with proper references or citation which is mainly part of the lab report too. Therefore, the data obtained from the science results demonstrated strong evidence that students were particularly challenged in writing lab reports, and writing essays with proper references or citations.

Cycle 2: Piloting the Transition Strategies

Experimentation and Writing a Lab Report Planning Sheet

Based on assessment result of the students' lab report, the students were not able to improve their lab report writing skills and the assessment results were very low. The results demonstrated that students were very strong in questioning, but the ability to answer the question was not there. This affirmed the claims of the science teachers. The results provided a lot of information benefitting the Grade 6 and Grade 7 teachers to understand the support needed by these students during the transition year. The data

are used as reference for Grade 7 teachers to determine the level of understanding and skills of the Grade 6 students before they move up Grade 7 and therefore, the teachers could plan well how to develop the students' laboratory skills. This confirms the statement "*An effective transition should guarantee continuity and progression in children's learning*" (Burr and Simpson, 2006).

Although the scores were very low in some criteria, the data collection method was effective to figure out more specific area of concerns. The students gained familiarity of the experiment process and writing a lab report.

Table 2: Inquiring and Designing

Criteria B Inquiring and Designing					
	Q	**P**	**V**	**M**	**Ave**
Max	**8**	**8**	**8**	**8**	**8**
S1	5	3	4	3	3.8
S2	5	2	4	4	3.8
S3	5	5	4	4	4.5
S4	5	1	4	4	3.5
S5	5	3	4	4	4.0
S6	5	4	3	4	4.0
S7	5	1	4	4	3.5
S8	5	1	4	4	3.5
S9	5	2	4	4	3.8
S10	5	2	4	4	3.8
S11	5	3	4	3	3.8
S12	5	2	4	4	3.8
S13	5	3	4	4	4.0
S14	5	5	3	3	4.0
Ave	**5.0**	**2.6**	**3.9**	**3.8**	**3.8**

Table 3: Processing and Evaluating

Criteria C: Processing and Evaluating					
	G	**C**	**E**	**E**	**Ave**
Max	**8**	**8**	**8**	**8**	**8**
S1	4	3	3	4	3.5
S2	4	4	2	4	3.5
S3	4	4	1	4	3.3
S4	4	3	1	2	2.5
S5	4	1	1	3	2.3
S6	2	0	3	2	1.8
S7	4	3	2	3	3.0
S8	3	3	1	2	2.3
S9	4	2	3	2	2.8
S10	4	3	1	1	2.3
S11	0	0	0	1	0.3
S12	0	2	3	3	2.0
S13	4	2	1	1	2.0
S14	4	3	2	3	3.0
Ave	**3.2**	**2.4**	**1.7**	**2.5**	**2.5**

G6 Assessment Results
Task: (Writing a Lab Report)
Legend: Q: Question, P: Prediction, V: Variables, M: Methodology, G: Graph, C: Conclusion, E: Evaluation

The table presented the results of the experimentation and writing a lab report planning sheet. The students obtained and average score of 3.8 out of 8 in criteria B and 2.4 out of 8 in Criteria C. The results demonstrated that students were weak at prediction which means that students were challenged in writing hypothesis with scientific reasoning. Manipulating variables and writing up methodology were other concerns. The students were not able to write up methodology properly with accurate measurement of the variables. The units of measurement were missing in the report.

Although the students were able to draw graphs to represent the data, there were missing details such as the correct significant figures and lack of high level of consistency with correct figures. Conclusions were weak. They were able to explain the conclusion based on results and hypothesis but the scientific reasoning was missing. Some scientific terminologies were introduced, yet, they were not able to use these scientific terms in writing up conclusion like variables, amount, respiration, anaerobic respiration, glucose and alcohol. Evaluating the conclusion and writing prediction were very shallow. Some students explained that the experiment did not work out because the yeast didn't like 4 teaspoon of sugar the reason why there was a decrease in the circumference of the balloon.

Cycle 3: Evaluation of the Outcome

Writing a Lab report and students' reflection

Some of the students' reflections about the use of referencing in their lab report and poster presentation were the following:

> *"If you don't use referencing, you might need to do everything again because it is a crime". [S1R]*

> *"In all your posters and group work, you should have referencing so they will know how you got it." [S6R]*

> *"If you use someone else's work, give credit to her." [S12R]*

> *"I learnt that when you take information from other sources, you should paraphrase it, change it, write the information in your own words. Referencing is very important if you take information from sources and MUST BE IN MLA FORMAT." [S3R]*

The statements above implied that students gained understanding on the use of references to avoid plagiarism and that is a requirement for their exhibition. Thus, the demonstration and experimentation did not guarantee that the problems identified were resolved in such a short time as developing the laboratory skills, writing essays and referencing skills required a lot of practice. They did not also guarantee that the Grade 6 students who went through the science transition would have better science results as compared to the current Grade 7 students. However, the strategies were able to introduce to Grade 6 students the lab report planning sheet of Middle Years, writing essays and referencing. The demonstration and experimentation provided practice for

G6 students to do experiment and write lab report similar to the requirement of the Middle Years. The students also gained knowledge about the science assessment criteria. These strategies were also beneficial to Grade 6 homeroom teachers in understanding about correct experimentation, aligning the lab report planning sheet and terminologies used.

5. Conclusion

Transition from primary years to the middle years was indeed associated with many challenges. Student challenges such as poor laboratory skills, referencing and writing reflection using science terminologies were found to be some of the student challenges. Primary year teachers lack of scientific skills and understanding is seen to be a hindrance towards teaching the students with basic scientific skills necessary to satisfy the middle year criteria. The differences between the primary years and middle years in terms of the nature of the learning process is seen to be a curriculum challenge that needs to be bridged. All these findings were necessary to design transition strategies that could assist the students in the transition year. Although one may not be able to realize the impact of the transition strategies on student academic progress, the activities have helped the students to be more familiar with the middle year science criteria and prepare themselves with the science requirements in the middle years.

References

1. De Arroyo, C. (2011). From PYP to MYP: Supporting transitions across the IB continuums. Voces y Silencios: Revista Latino Americana de Educación, 2(1), 39-61.
2. Evangelou, M., Et al. (2008). What makes a successful transition from primary to secondary school? Retrieved February 1, 2018, from http://webarchive.nationalarchives.gov.uk/20130401151715/http://www.education.gov.uk/publications/eOrderingDownload/DCSF-RR019.pdf
3. Hanewald, D. (2013). Transition between primary and secondary school: Why it is important and how it can be supported. Australian Journal of Teacher Education, 38(1), 61-74.
4. IBO. (2011). Science across the IB continuum. Retrieved from https://robertsib.wikispaces.com/file/view/Science+across+the+IB.pdf
5. IBO. (2012). Developing a transdisciplinary programme of inquiry. Retrieved from https://resources.ibo.org/pyp/resource/11162-occ-file-p_0_pypxx_poi_1202_1_e?
6. IBO. (2014). MYP: from principles to practice.
   Retrieved from https://resources.ibo.org/myp/resource/11162-32896?
   IBO. (2014). Science guide. Retrieved from
   https://resources.ibo.org/myp/subject-group/Sciences/resource/11162-32957?

7. Humphrey, N., & Ainscow, M. (2006). Transition club: Facilitating learning, participation and psychological adjustment during the transition to secondary school. European Journal of Psychology of Education, XXI(3), 319-331.
8. Kirkpatrick, R. (2011). The negative influences of exam-oriented education on Chinese high school students: backwash from classroom to child. Language testing in Asia, 1(3), 36-45.
9. Mackinzie, E., Mcmaugh, A., & O'sullivan, K. (2012). Perceptions of primary to secondary transitions: challenge or threats? Issues in Educational Research, 22(3), 298-314.
10. Topping, K. (2011). Primary-secondary transition: differences between teachers' and children's perceptions. Improving schools, 14(3), 268-285.
11. Zeedyk, S., et al. (2003). Negotiating the transition from primary to secondary school: perception of pupils, parents and teachers. SAGE Social Science Collection, 24(1), 67-79.