Principal Moderator Feedback

Summer 2015

Pearson Edexcel GCE
in Biology (6BI06)
Practical biology and investigative skills

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All centres, regardless of their chosen mode of assessment, are strongly recommended to consult the 'Internal Assessment Guide' available for download from the Pearson website. This contains a range of explanation and exemplification which reflects on the standards employed by all moderators and examiners.

Range of investigations

The range of investigations was similar to previous years. The large majority of laboratory and field investigations offered good opportunities for candidates to display their 'How Science Works' skills. However, some approaches did place significant limitations on candidates' access to higher mark levels in some criteria.

These fell into three distinct categories.

(a) Investigations which were merely repeats of core practicals. In these cases the examiners and moderators assumed that all candidates had been given full instructions and hence planning was expected to show the technique had been applied in an interesting way. This posed some challenges in controlling variables etc. By far the weakest investigations in this category were attempts to add a whole variety of products and 'essential' oils to bacterial lawns. There were many such approaches which lacked the slightest biological background and it was common for various products to be added without any indication of their contents or consideration of such vital variables, such as concentration. Not only were plans simply copies of the core practical but unsurprisingly many were unable to explain their results biologically.

(b) Investigations which involved little more than growing seeds in a petri dish, in uncontrolled laboratory conditions, and measuring them. Not only was it difficult to distinguish any progression to A-level but there was extremely limited understanding of what might constitute 'growth' or the events of the early stages of germination and how the difficulties in measuring might be overcome in a reliable fashion.

(c) Investigations where there was a heavily-directed, centre-specific approach which stifled individual thinking. This often led to illogical presentations and ideas which were not well-linked to the hypothesis being tested.

Research & rationale

There were some excellent examples of individual research of original ideas. Many were based on routine A-level biology but asking interesting questions. The common theme was that they demonstrated an understanding that there are many biological questions which are more complex than a standard text-book explanation.

The most common example from fieldwork was the effect of light intensity on different variables such as leaf size or overall height. Many weak explanations were awarded high marks by internal assessors in this section. Most seized on the simplistic idea that more photosynthesis = more growth and then used this as an excuse to regurgitate their standard biochemistry of photosynthesis. Even the sources used were merely internet alternatives of diagrams and quotes, to their text book and notes. Good research revealed that most of the photomorphological effects needed to be brought about during early development of stems and leaves, and that there is still considerable debate about photoreception and the mechanism by which such fundamental changes in structure are brought about. The weaknesses here were often highlighted by the fact that, despite planning and undertaking an ecological investigation, there was no consideration of the ecological background at all.

There was a welcome increase in the number of candidates using their research to make decisions in planning, but whilst many also used this to explain the actual data they collected in I(b), there was a surprising minority who applied very little to their conclusions.

Planning

Most candidates attempted to control basic variables in P(a), but some did not explain their thinking in this key element of experimental design. This was often linked to a weak attempt to trial important factors in P(c).

Good trials concentrated on testing important features of the methodology. They concentrated on ensuring that both the dependent and independent variables would be measured or monitored in a reliable manner. Weak trials were obviously just a practice of some pre-determined plan or a demonstration of the obvious. E.g. the actual investigation would require more data collection than a simple trial, or despite previous comments in these reports, a Vernier calliper might be more accurate than a 30cm ruler! Many gave assertions which were simply not demonstrated by the data they collected.

Observing

Whilst most were given credit for tabulation of their data and its suitability for testing the hypothesis, there were a small minority who did not include their raw data and therefore could not be awarded more than O(a) 0-3.

The examiners would like to stress that O(b) 7-8 can be awarded where there are obviously no anomalies, provided that there is some brief comment by the candidate on why they have come to this decision. There were some examples of extremely large anomalies that came beautifully into line with a simple repeat without explanation; and so stretched the bounds of credibility.

Interpreting and evaluating

One again, most candidates applied a statistical test and justified high marks for I(a). However, for the award of 7-9 marks the criteria indicates that there is an understanding of a null hypothesis and the 5% confidence limit. Merely stating some other level of probability without indicating an understanding of this norm, does not meet this requirement. The need for numerous statistical tests is usually a good indicator of poor initial planning.

The examiners have commented in the past on the requirement for researched biological information to be used in interpreting data for I(b). Many candidates clearly indicated their sources in this section to good effect, but merely finding research which gave similar results does not meet the requirement to give a clear biological explanation. A surprising number of candidates gave only a few lines to I(b) and some did not include any biology at all.

Many more candidates now appreciate the need for evidence-based analysis in their evaluation, but to be awarded higher mark ranges candidates need to show they understand the meaning of such analyses as standard deviations and not simply tabulate the figures.

Communicating

Despite numerous previous references and details in the 'Internal Assessment Guide' a large proportion of candidates submitted very poor bibliographies consisting of little more than a list of internet references. It is not the task of the examiner/moderator or any reader to search for the details of such references and this was particularly true of references claimed to be scientific journals, which were neither named nor clearly identified.

It is not necessary for candidates to evaluate every reference they quote. The examiners are looking for objective evaluations of a sample of the types of references quoted. Merely introducing a brief mention of peer review or cross-referencing did not provide a coherent evaluation and there were many examples of extreme naivety when evaluating internet sources.

Internal Assessment

There remains a significant number of centres where moderators are unable to support the marks awarded. The main reasons for this were as follows:

(a) Assessment of each sub-section of a criterion was not recorded and therefore it was not clear if the hierarchical marking principle had been applied when aggregating these into a total mark for the whole criterion. Moderators apply this method rigorously as shown in the Internal Assessment Guide.

(b) Internal assessment did not always make quality judgements when applying mark ranges. This led to a tendency towards awarding marks more on the basis of actually addressing a criterion rather than the quality of the response. A consequence of this was that reports of very different standards were awarded very similar, extremely high marks.

Typically, in the example given in comments on Research and Rationale, a candidate simply repeating standard biochemistry of photosynthesis and some sources of the same information would be awarded the same maximum mark as a candidate who had researched the possible causes of phenotypic plasticity and the need to have their effect before any change in photosynthetic rate can be achieved.

This approach was often characterised by simply repeating phrases from the criteria on the record card with little comment on the actual report.

It would be helpful for internal assessors to consider the relative merits of reports carefully and reflect upon their comparative quality both within the centre cohort and with regard to published grade boundaries. Unit 6 has many difficult criteria which are expected to be addressed as part of a whole investigation and the published grade boundaries reflect this difficulty (grade A = 33 and Grade A* = 38). On the evidence of the moderated samples there are some centres where a large majority of candidates demonstrate HSW skills at these levels but moderators were unable to support this view for a significant number of others.

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