

Group Work in Science – How do you do it?

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Overview

From 1993–1997 the subject “Introductory Immunology” was delivered in “traditional” mode with 3 hours of lectures and 3 hours practical/tutorial classes per fortnight. However, it was believed that this structure provided little opportunity for students to develop as independent learners (Candy, Crebert and O’Leary, 1995), nor did it help them to develop the skills and attitudes that are essential in graduates such as critical analysis, problem solving, communication and working in teams (B/HERT, 1992; NBEET, 1992). Typically, students enrolled in this subject were used to a teacher-led learning regime and not usually familiar with group learning as an educational technique and, although students worked in small groups (n=2 to 4) during laboratory sessions, the groups were often friendship partnerships and provided little opportunity for cooperative learning.

In 1997 we undertook an evaluation of the effectiveness of the existing delivery methodology, both from the viewpoint of the skills it aimed at developing and from the students’ perspective. In 1998 the subject structure was changed from its traditional presentation mode to group work, use of reflective journals and workshops. Student opinion was canvassed during this period with respect to their expectations, their concerns and their preference for particular learning modes.

Subject delivery

The content and concepts of immunology were delivered by audio tapes, study guidelines and brief lecture notes, instead of traditional lectures.

Evaluation

Effectiveness was examined from two perspectives:

1. The students were surveyed three times during the semester.
 1. *Entry survey*: administered at the beginning of the semester canvassed students expectations.
 2. *Progress survey*: conducted at the conclusion of an early workshop session. This survey sought to explore the students’ initial perceptions about the benefits and disadvantages of the newly implemented teaching and learning strategies.
 3. *Exit survey*: administered at the end of the semester. This survey canvassed student study behaviour throughout the semester and sought to identify areas of perceived benefit and/or weakness and opinions about the subject structure.
2. Quantitative comparisons were made between assessment results achieved via the traditional teaching approach, from the previous year’s cohort of students, and the new methodology.

Outcomes

Student perceptions

Survey 1: Entry survey

If given the choice, 89% of students would have chosen to do immunology, either out of personal interest (44%), because it was good knowledge to have (28%) or a prerequisite for their chosen career path (39%), or simply because it was perceived to be enjoyable (11%). Expectations about the subject varied, the largest number of students (48%) expected to gain an understanding of how the immune system functions or be given a solid background in immunology (33%).



Survey 2: Progress survey

The second survey was undertaken four weeks into the program. At this stage, student opinion about how well the combined strategies aided understanding ranged from poor (9%), through to adequate (41%) and well (38%) whilst a small number thought the new strategies worked very well (12%).

Opinions varied about the effectiveness of the tapes as a source of information, though 50% thought they were either effective or very effective, and a further 35% perceived them to be adequate. At this stage in the semester, 71% were using their textbook as a resource, but of these only 52% believed it to be effective or better. Students also varied greatly in their opinion of how well the group discussion/workshop format helped understanding, the majority (88%) were positive, thinking they worked adequately (24%), well (44%) or very well (20%). A large majority (91%), were impressed with how well their groups had functioned thus far.

However, when asked what parts have proved most difficult, 32% had complaints about the audio tapes, specifically the length of time required to listen and take notes, the lack of interaction with the lecturer and the quality of the tape itself. A small number (18%) experienced difficulties due to a perceived lack of time in which to do the work.

Survey 3: Exit survey

When asked how effective each of the delivery strategies used during the semester had been in aiding learning in immunology, students felt that the regular quizzes were the most effective learning strategy with 86% ranking them good to very good. Over half the students were supportive of both the audio tapes and assignments (59% good or very good).

The reflective journal was not favoured. Only one student always used it, with 68% either only using it sometimes (50%) or never at all. Student attendance at the workshop session was not officially recorded, but student feedback indicated that little more than half (59%) always attended, with a further 32% attending most of the time. Of those who participated in the workshop sessions, 86% stated that they always (41%) or mostly (45%) engaged in the discussions.

Group work was only popular with a few students (18%). The workshop sessions requiring group work were found difficult by some (32%) as:

- working in groups increased confusion for some students;
- students didn't use their time effectively during these sessions;
- discussion was limited as not all students listened to the tapes prior to class;
- work undertaken in the sessions was too predictable; or
- was perceived as less important than other aspects of the curriculum.

Suggestions for change included the reintroduction of lectures (27%), the introduction of a tape/lecture combination (9%), summary/plenary lectures (9%) or increased lecturer input during workshops (9%). Other suggestions included a finetuning of the workshop and group work format (14%).

Comparisons of student grades

The spread of student grades from the Phase Two students showed a typical spread as shown in Table 1.

Student Cohort	HD	D	C	P	F	I	W
1997	0	3	24	45	28	-	-
1998	2	12	21	18	35	7	5

Table 1. Grades received by students (%) in the two cohorts of students in 1997 and 1998

Content complexity and delivery strategies

Much of the dissatisfaction expressed by the students about their study of immunology, either by way of the traditional or the new approach, may in part, have been due to the level of complexity of the material covered. Almost 60% of students felt that audio taping of lecture material was effective, many appreciating the ability to refer to tapes again when studying for exams. Though the most favoured approach was the workshop quizzes, probably because they allowed students to get regular feedback about their level of understanding and to gauge what aspects of immunology the lecturer deems most important. This is also indicative of the weight many science students place on summative assessment. Student preference for delivery strategies was quite divergent, indicating the variation in individual learning styles and preferences that can exist in one class.

Reflective and experimental journals

As so few students completed the reflective journal assiduously, it is impossible to comment about the effectiveness of such a learning strategy. Journal writing as a learning strategy is not common in the sciences, although working scientists would employ such a practise in documenting their laboratory endeavours. The experimental journals enabled students to practice the skills of documenting scientific procedures, and the thought processes that a scientist must cultivate. It is suggested that a more effective structure be developed for the journal to serve a dual purpose: exploration of the subject knowledge base and articulation of the underlying rationale of laboratory work.

Workshops

The workshop sessions were not as successful as anticipated. There were three major reasons for this:

- students lacked the training in group, teamwork and communication skills;
- teaching staff needed more resources to call on in order to get students to be active in their learning; and
- these sessions required students to be more actively engaged in the process of learning and carry a greater load of responsibility for directing their own learning, not all students were ready or willing to cooperate.

Conclusions

The restructuring of “Introductory Immunology”, involved a more student-centred and resource-based learning regime which incorporated audio taped lectures, student-led workshops and journal writing. It was anticipated that this approach would produce learners who were more actively engaged in the process of learning, carrying a greater load of responsibility for directing their own learning.

It is concluded that such objectives can only be achieved if both staff and students have a clear understanding of the benefits of the learning approach and a willingness to undertake new roles and responsibilities and finally the knowledge of “how” to effectively change their learning styles.

References

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