

## TEACHING BY JUNIOR-SENIOR METHOD

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**Annotation:** This article is about the junior senior method, one of the new methods that has been developing in recent years, and describes the experiments conducted on the basis of this method, the results of these experiments. You can find out the results obtained by using this method.

**Keywords:** education, individual students, consultation of the literature, effect, junior students, PAL program, professional competencies, specific peer-to-peer learning environment.

Today, with the large number of students attending college, education in general, and science education in particular, is in danger of becoming diluted for the sake of mass education. In order to attract, hold, and better prepare students, many institutions have been experimenting with honors and other specialized programs. Acceleration has often been referred to in discussions concerning this type of student. Acceleration obviously has a role in any program. But we might ask, is the addition of more courses in this acceleration, courses that a student might pick up at graduate level, the answer? It is also important that the student not be placed under the constant pressure to do only what is "essential" for his career. Rather than have him take certain courses his friends have suggested to make graduate or professional school easier, we recommend and have tried research.

Individual students were given subdivisions of the project which included giving thyroxine alone, reserpine alone, a combination of thyroxine for two days,

reserpine for one day; with sequence repeated; a combination of thyroxine for one day and reserpine for two days with the sequence repeated. Animals were in groups of six and were weighed each week, weights compared graphically with those of control animals over a two semester period. This project required consultation of the literature regarding action of the two drugs. Another group studied litter size with the same drugs and drug combinations with comparisons made with control groups over a two semester period. Another group project, a little more advanced and requiring more and better equipment, had to do with primary production rates in aquatic habitats. The effect of water exchange on control of productivity was studied. A series of aquaria were inoculated with algae, and productivity was measured over a period of weeks testing the separate and combined influences of turbidity and dissolved mineral content. Various levels of turbidity and concentrations of dissolved minerals were introduced and studied.

What value did this have for the student?

1. It taught them that routine daily care and cleanliness is important for live animals. Routine weighing and recording of data and working it up was important.
2. They found that results in every instance were not quite as expected. Although thyroxine accelerated metabolism, this did not necessarily mean a gain in weight.
3. They found it was necessary to change and adjust dosages up or down in many instances as toxic effects could be noted with prolonged treatment, and different combinations had to be worked out.
4. Consultation of the literature was necessary, not only before the project was started to see if they were duplicating work already published, but consultation of literature was necessary throughout the project. This gave them a good knowledge of the literature.
5. They learned the value of exchanging data and experiences with others on the project.

6. They found it necessary to do much supplementary reading in anatomy, physiology, histology, microtechnique, nutrition, organic and biochemistry.

They observed the close relation of the areas of science. This was more than they would have found out in an ordinary formal course.

7. They made a small contribution to our ever increasing knowledge of science. This contribution was written up in the form of a paper according to the criteria of Porter. This paper will be published in the Proceedings of the Iowa Academy of Science.

A total of 40 % of senior students participated as tutors and 65 % of junior students as tutees. The end of year questionnaire response rate was 48 % (20/42). Most tutors (19/20, 95 %) felt confident to teach tutorials although one-third (6/20, 30 %) would have preferred more training in teaching. Tutors felt that the program better prepared them for their exams. Almost all tutors (19/20, 95 %) enjoyed teaching and felt it fostered a sense of community at CCS (17/20, 85 %). Tutors stated they were likely to be involved in teaching in the future (17/20, 85 %).

This student initiated PAL program provided tutors with the opportunity for content and clinical skills revision and assisted in the development of professional competencies required on entering the medical workforce. The resultant sense of community at CCS will aid the expansion of the program in 2015 with an aim to review quality assurance measures.

Tutors were allocated in pairs, to ensure that at least one tutor was available for each tutorial. Tutors were allocated to the same group of three to four tutees for the entire year. Tutors were provided with a 1 h information session detailing the objectives and organisation of the program, and the format of the tutorials. It was suggested that tutorials be held fortnightly at a minimum, with the choice of more frequent sessions if desired.

Tutorials were approximately 1 h long, covering clinically relevant content. The topic of the tutorial was identified by tutees, who notified the tutors of this topic

several days in advance of the tutorial, allowing them adequate time to prepare. Once the topic was identified, tutors largely drove the style and method of teaching and the depth of content. Tutorials were designed to supplement existing teaching in order to enhance the tutees' knowledge base. The delivery was not intended to be didactic, but interactive, with the ideal tutorial having 20 min of theoretical content, 20 min of clinical application of the content through the examination of a patient on the wards or review of laboratory results, and 20 min for discussion of the case. The format was flexible according to tutor and tutee preference.

One-page handouts were created for content-driven tutorials. This encouraged tutors to remain concise and clear. Handouts were uploaded to a shared online folder, accessible by all participants in the program, allowing students to benefit from other tutorials as well as their own. In order to minimise the potential for teaching of incorrect content, three junior medical officers (JMOs) at the hospital with an interest in peer learning and prior involvement in similar programs kindly reviewed the content in the handouts in advance of the tutorials.

This study specifically sought to investigate tutors' experience within the PAL program, particularly with regard to their confidence and preparedness for teaching and the associated benefits and challenges of peer-assisted learning. Tutors identified three key benefits of their participation, including knowledge and skills revision; development of professionalism attributes; and fostering a sense of community within CCS. Students also made suggestions to improve the program that largely related to timetabling and administration of the program.

The majority of tutors felt their knowledge base was adequate for each tutorial (20/24) and most students felt competent to teach. Two-thirds of tutors (28/42) had previously completed an evidence based clinical teaching course, 'Teaching on the Run', at CCS, reflecting a general interest by medical students in developing specific teaching skills. In addition, students at CCS are exposed to programs on receiving and providing peer feedback in the clinical setting from Year 1. Only

8/24 (33.33 %) of students desired formal training prior to becoming a tutor. It is unclear from the anonymity of tutor questionnaires whether those students who desired more training had previously completed the Teaching on the Run course, or indeed found the principles of the course applicable in the peer-to-peer setting. Future research should ensure standardisation of teaching skills in this context.

The student-driven nature of the PAL program meant that there was a strong reliance on self-directed preparation from the tutors. Actual tutor competence or performance was not assessed on an individual basis. Moreover, opportunities for corrective feedback regarding content were limited to JMO review of the handouts. Training in the health professions is increasingly exposed to unsupervised learning methodologies. It is well established that students are capable of effectively modifying their cognition and motivation to achieve learning goals, however, these tools may be less effective when unsupervised. The same may be the case for student tutors.

The development of the tutorial outline and content by tutors can facilitate deeper learning, and can help students to reflect and expand on their own knowledge. Tutor feedback indicated that teaching of peers, particularly the preparation for the activity, allowed revision and reinforcement of their own knowledge and clinical skills. A large proportion of tutors (14/24) identified that the program developed their own understanding of medical concepts and felt better prepared for their own written and clinical exams (10/24).

Underscoring the program is the development of a sense of community within practice groups and across CCS. More than half (108/207) of the entire study body, from Year 1 to Year 4 had voluntarily chosen to take part in the program. Student responses highlighted altruistic reasons for volunteering to tutor their peers. Tutors felt that they were fostering a supportive environment for their junior peers. Most tutors (20/24) '*enjoyed*' teaching their peers. Peer assisted learning relies on the construction of knowledge as a social attribute, rather than individually acquired

knowledge. Legitimate peripheral participation is a central notion to the development of a community of practice. Through the PAL program, tutees and tutors are given the opportunity for meaningful participation within a community of practice. In particular, by engaging tutees as directors of tutorial content, the exchange of information through structured tutorials within the student community strengthened the sense of community at CCS and added to its social capital.

Future iterations of the program should focus on quality assurance in order to both assist tutors in development of their teaching skills, and provide quality assurance to the program. This could include the implementation of more intensive teacher training and assessment, with particular regard to the specific peer-to-peer learning environment, followed by direct observation, tutee evaluation, and provision of feedback on tutor performance by the organisers of the program.

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