

Collaboration or Plagiarism: What happens when students work together

Janet Carter

Computing Laboratory
University of Kent at Canterbury
Canterbury, Kent, UK
+44 1227 827978

J.E.Carter@ukc.ac.uk

ABSTRACT

This paper describes the findings of a small-scale case study concerning the collaborative aspects of student working practices. It is a pilot investigation into the strategies that are employed by students when attempting Object Oriented programming exercises outside the formal classroom setting.

Some of the collaborative practices are simple cases of copying, but others, despite falling within the definition of plagiarism, are a beneficial, and possibly useful, means of enhancing the learning process.

Although this study only focuses upon a small group of students in one UK University, the practices highlighted are unlikely to be confined to this one setting.

Keywords

Constructivism, scaffolding, plagiarism, collaboration, co-operation, programming.

1. INTRODUCTION

As educators we help our students to learn by providing structured help and guidance, as well as presenting course materials to be assimilated and understood. However, students also help each other. They collaborate with each other, provide support and encouragement, and also help each other to correct mistakes that inevitably occur.

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This paper reports the results of a small-scale pilot investigation into the nature of the collaborative aspect of the teaching and learning process within the UK HE sector. The exploration took the form of a study of the interaction between students who worked together on set tasks.

The educational system in the UK is traditionally ambivalent towards group work. There appears to be an implicit assumption that unless students are explicitly told to work in groups they will work alone.

This assumption is also formalized within the non-statutory guidance for the National Curriculum, which is taught to all state educated children aged between five and sixteen within England and Wales [5]. In some educational cultures, such as the USA, group work is a vital part of the educational process. The group dynamic and the roles that individuals should play are learned from an early age, and college students appear to fall naturally into this type of self-help study group. There are also cultures where collaborative learning is actively discouraged. In some Australian universities norm-referenced marking is an established practice, and this encourages students to compete rather than collaborate. But what actually happens in the ambivalent UK?

2. THEORETICAL FRAMEWORK

In 1979, William Kessen [7] wrote a landmark paper in which he challenged some conventional assumptions about the status of psychological theory. He argued that psychological knowledge about learners and their cognitive development is not universal and immutable. It is culturally and historically located, and as such, any theories purporting to describe or explain development are themselves cultural constructions.

His paper was the first to recognize the influence of dominant cultural values, and as such is credited with being a major influence on the current popularity of constructivism as a model for education. His work also implies that, although much work has been done in this field in the USA, it is unlikely to be transferable to the UK.

2.1 Scaffolding

A constructivist approach to teaching and learning involves both the teacher and the student being active in the process. The teacher must do more than simply stand at the front of the room transmitting information in the hope that the students will simply understand. And the students must actively engage with the material and the concepts, rather than let them pass from teacher's voice to notebook page without entering the brain.

The supportive role played by educators in a learner's cognitive development is called scaffolding [1]. A teacher, or more competent peer, lends support to a learner enabling them to achieve the requisite skill or understanding, and then progressively removes the support in such a way that the learner can function autonomously.

Much of the UK based work in this field has concentrated upon the scaffolding provided by the teacher, and has ignored peer effects. The work which has involved looking at peer interactions has concentrated upon the development of small children, but the principles discovered here are also applicable to older learners. Indeed, Cazden [3], whilst researching into the processes involved in the initial teaching of reading to young children, identified two distinguishable types of scaffolding. The first is sequential scaffolding, which involves the adoption of routines and conventionalized activities. The predictable nature of the routines provides a supportive framework within which learning can take place. The second type is vertical scaffolding, which involves extending the learner's abilities by such means as asking questions and requesting elaboration.

2.2 Applicability to Undergraduates

2.2.1 Sequential Scaffolding

At undergraduate level some students seek collaboration with others whilst some wish to work alone. When young children work together they produce significantly better results than when they attempt a task alone. The social context is of such a character that a child has to take account of their partner's view in order to pursue the interaction [6]. It can be further argued that when children who work together are assigned specific roles they also produce significantly higher levels of individual achievement [8]. Are undergraduate students who collaborate capable of adopting specific roles without the intervention of a teacher, thus demonstrating sequential scaffolding?

2.2.2 Vertical Scaffolding

A learner influences the scaffolding process by indicating the level of assistance required. When the learner experiences difficulty more help is required; when a task is easy less help is required. If a teacher is sensitive to the needs of the learner and can adapt the help provided accordingly, then they are said to be demonstrating contingency [9]. If students can be seen to be contingent upon each other, whilst providing differing levels of help then there may be evidence to show that they are also demonstrating vertical scaffolding. This does, however, depend upon the contingent student being 'more capable' at the particular problem area – a vital part of the definition of scaffolding.

3. METHODOLOGY

The effect of peer scaffolding does not appear to have been considered particularly important (in the UK) for students at undergraduate level, little research has been conducted, and as such little is actually known beyond anecdotal evidence and what lecturers *think* is happening. Many of the arguments about the relative difficulty students have when learning Object Oriented Design appear to be based upon the premise that the learning experience for students is similar to that of established academics [4]. Academics tend to learn alone, setting themselves tasks that they may find interesting or useful at a later date. Students, however, learn as a group and have their ability to design and

code assessed at regular intervals, and do *not* have the opportunity to choose the task. The experiences are not the same.

3.1 Background Information

3.1.1 The Cohort

There were approximately 130 first year Computer Science students in the 1997/8 academic session at the University of Kent (UKC). 85% were of UK origin and the remaining 15% comprised mainly other EU nationals. Approximately 10% of the cohort were female.

As in all UK universities the nature of the cohort is changing. There are more mature entrants, more non-standard entry qualifications (i.e. fewer students with three A level qualifications and more with vocational qualifications such as BTEC), also more of the cohort are recruited locally than has previously been the case.

The students in this particular first year cohort appear to fall into three broad groups. The first diligently attend all lectures, read the lecture notes and recommended text books, and attempt all exercises whether assessed or not. The second (which forms the majority) comprises those who, after an initial burst of diligence, settle into a pattern of attending most lectures and putting a fair amount of effort into assessments but otherwise not over-stressing themselves. The final group comprises the students who attend only what is compulsory, some because they think they know it all already.

3.1.2 Choosing the Participants

The study was designed to be small-scale and informal. Students had to be prepared to talk about their learning experiences and their working practices – including copying answers from others. Despite explaining to the students exactly what would be required, and assuring them of confidentiality, it was unclear at the outset exactly what information it would be possible to elicit. Bearing this in mind, it was deemed sensible to simply ask for volunteers who were willing to participate rather than adopt any formal sampling strategy. This does, inevitably, lead to bias, but the study is only a pilot aimed at paving the way for a deeper, more principled, study at a later date.

3.1.3 The Programming Course

The structure of the Java programming module entails students attending three one-hour sessions per week for the whole academic year. Two of the sessions are lectures and the remaining session is a seminar during which details of programming assessments can be discussed along with broader Object Oriented Design issues.

In the 1997/8 session the programming assignments ranged from printing shapes on the screen in November to simulating a simple petrol station in April. The time allowed to complete these tasks was typically 10-14 days.

3.2 Methods

The data necessary for this type of investigation is necessarily of a qualitative nature. A large-scale survey, or questionnaire, would not yield the required information. Qualitative methodologies, unlike quantitative ones, are grounded in the assumption that the way in which individuals make sense of their world is subjective and situational, rather than as one objective truth. They are small-scale and in-depth. They are also time-consuming, principled and

systematic, but they are not 'scientific'. Data can be categorized and analyzed, but it cannot be subjected to the statistical methods of numerical analysis used in quantitative research.

The students were approached and asked if they wished to participate. We stressed the necessity to be honest, and asked them to admit to any instances of copying. In return we guaranteed confidentiality. Any students who did participate in illegal practices and also participated in the study had the same chance of detection as if they had not confessed.

Twenty-eight students volunteered, but only fifteen participated throughout the entire year. Only the fifteen sets of complete data were used in the analysis. Many of the incomplete sets of data consisted of only an initial interview. Two students also declined to participate further when they were caught for plagiarism shortly before the Christmas vacation.

The data collection took the form of semi-structured interviews, observation, and the occasional email conversation. Students were interviewed on a regular basis throughout the entire academic year, with particular emphasis placed upon the data collected immediately after an assessment deadline. Observations were made within seminars on a monthly basis. The triangulation of several different data collection methods provided corroborative evidence for the validity of the findings.

4. RESULTS

In this study we took a grounded theory approach, allowing the models to emerge from the data rather than imposing existing theories on our results. We were not seeking to determine whether our students could be said to follow, say, the US model, but to discover what they actually do.

The models identified fell into three broad categories. The first is the loners, who did not seek any substantive form of collaboration or support. The other two models were labeled the collaborators and the co-operators. It is easily possible to distinguish between co-operation and collaboration; co-operation is the typical 'back of an envelope stuff' whilst collaboration is joint work.

4.1 The Loners

There were three students that fell into the category of loner. They are all students who tended to sit alone in seminars and did not interact with other students in class (beyond the occasional idle chatter before work commenced) unless they were specifically told to work in a group. All three were male, with one being mature. Their work followed a broadly similar pattern throughout the entire year. They would attempt the work and would then follow one of three distinct routes.

1. Complete the work without too many problems.
2. Get stuck and copy the work from someone else.
3. Get stuck and ask their supervisor for help. This would lead to either successful completion of the work, or asking to copy from someone else.

This model did not encompass any form of peer scaffolding, and if at the time of the final deadline for submission, the work was not complete they tended to hand in nothing rather than admit to having only partially completed the program. This is despite the lecturer making it explicitly clear that partial solutions gain marks whilst no solution gains no mark.

4.2 The Co-operators

There were several groups of co-operators within the sample. Once the groups were established, part way through the first term, their composition did not vary. In fact, these students have carried their working practices into the second year of their studies. Each of the groups followed the pattern outlined here.

1. Discuss the assessment problem and possible solutions.
2. Work independently to produce a first cut at a suitable solution.
3. Discuss their approaches, help each other (where possible) with any difficulties that have arisen. Jointly approach a lecturer or class supervisor for help if the difficulties cannot be resolved.
4. Finish their own solution independently, repeating stage 3 as necessary.

The students following this pattern tended to work in pairs or in threes. There was one group of mature male students, but the others were mixed groups. Indeed, all the female participants in the study fell into this category, and this suggests that gender will be an important issue to consider in further work [2]. They appeared to gain the maximum benefit from their approach, providing both help and support for each other. The abilities of the students varied quite considerably, and in one particular case the other students in a group spent quite some considerable time explaining concepts and debugging code for their friend.

The students following this model demonstrated both vertical and sequential scaffolding at some point throughout the year. The vertical scaffolding took the form of explaining procedures and concepts and the sequential scaffolding was the encouragement they gave each other to keep going when things became tough.

4.3 The Collaborators

Most of the collaboration groups changed personnel several times during the course of the year, although there was one notable exception. This was a group of three male students who had previously attended the same college and applied to university together. These three students worked together on all assessments for all modules, even when they were placed in different classes.

The groups tended to change personnel when they were caught copying, or if one student expected to simply copy the work of others without doing anything in return. After a while the groups became stable, particularly when the students realized that it was more difficult to spot their cheating if they were in different seminar groups.

Two distinct working patterns emerged. The first being adopted by all the collaborators at some point, and the other quickly being adopted by one particular group. This was shortly after they had all been awarded a mark of zero, because their solutions were too similar.

1. Students work together to produce one complete piece of working code. The students participating in the study expressed that the work was a genuine joint effort although many admitted to changing comments and, if they were not specified in the assessment question, method names in an attempt to avoid detection for plagiarism.

2. This was a more organized and ruthless attempt at workload reduction and time saving. Students allocated the menial tasks, such as typing in class headers and method headers, to a different member of the group for each assessment. They then copied these to each other, and worked in a similar manner to the co-operators to complete the task.

Some of the students following this model did simply copy the work of their peers, but most tried to 'do their share'. It was apparent to the participants that some were weaker than others, and they accounted for this by expecting a more routine or menial contribution from the weaker student. Nobody was excluded for lack of ability – just for lack of effort.

The students who follow these collaborative patterns are most definitely demonstrating sequential scaffolding, and those following the second are also, when necessary, providing vertical scaffolding of a similar form to the co-operators. There is no allowance within UKC guidelines for students to admit to their collaboration without severe penalty. Those students following the first of the patterns did *not* perceive their methods as plagiarism, rather as each member "doing what they could". Those who were weak simply provided less of a contribution, or did more routine aspects of the work, which they all considered to be fair.

5. SUMMARY

The students who wish to work alone do not generally breach any plagiarism rules, unless they blatantly copy the work of another student. The students participating in the study did not admit to doing this on a regular basis, stating that it was against the rules, and most (but not all) of the incidents where it did occur were detected. The students are aware that copying is wrong, and that they should not do it, but when asked they also admit that they find nothing wrong with handing their work to someone who asks. Both co-operators and collaborators have been known to hand their solutions to people they did not work with simply because they were asked, despite expecting their partners to do more than simply copy.

The UKC regulations for students state that "a student must not reproduce in any work submitted for assessment any work authored by another without clearly indicating the source". Both co-operators and collaborators break this rule; collaborators because they share the effort, co-operators because they have a tendency to rewrite chunks of code when they help to fix bugs. When lecturers detect similarities that imply copying they usually interview students in such a way that although collaborators can eventually share the mark the work earned, they feel that they have been punished for the more serious crime of blatant copying. They then feel that they must hide their working practices, rather than admit to them and obtain a shared mark for future assessments. The collaborators who provide templates for each other are also in breach of the rules. We did not realize that this working practice occurred. The skeleton program that all members of the group use is totally transformed by the time the programs

are complete. All the students have had to write the main method, the class headers and the method headers, so they have learned the syntax required, but they have used the work of another in their solution without attribution. How many students work in this manner, and should it be acceptable?

6. CONCLUSION

The approach adopted in this study has been investigative, and has tried to identify how students approach the types of learning task currently set by their lecturers. It is not intended to suggest that teachers modify the tasks they set – students would simply modify their behaviour to adapt to the new scenario. It is not possible to *make* students work individually, we cannot be there to supervise when they are outside the formal classroom setting.

Plagiarism guidelines, however, need to be written in such a way that they take into account what students do, *and* how this fits with what lecturers want. The first step towards this is finding out what actually occurs, and this pilot study should lead the way into a deeper study that can inform the changes.

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