# CHANGING CONCEPTIONS: SUPPORT FOR THE ADOPTION OF COMPUTER-MEDIATED COMMUNICATION

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## *ABSTRACT*

*The last year has seen a dramatic rise in the use of Computer-mediated Communication (CMC) in the form of web-based conferencing, at the University of Technology, Sydney (UTS). TopClass, a web-based conferencing system, is being used to support student learning for more than 6,500 students in 80 subjects. As CMC starts to move into the teaching mainstream, reflection on the factors contributing to this successful adoption of an educational innovation will be of use to teachers and institutions considering the use of CMC.*

*This paper reports on the strategies used by staff from the Institute for Interactive Multimedia, a UTS central unit with a strong focus -on teaching and learning with technology, to support the introduction and use of CMC. Details of, and reasons for, the success or failure of these strategies are given. By drawing connections to theories of innovation diffusion and to some of the literature on staff training for the use of IT, the reasons for the success of the program to date become clear.*

*For teachers adopting CMC, learning the tool is only part of what's needed. Socialisation in the medium and an understanding of the institutional context are also important. Successful practitioners of CMC at UTS see their results coming from an understanding of how students learn, and from choosing effective teaching strategies that make use of this understanding. Engaging with the pedagogical issues of CMC like these is an effective way for staff to examine their conceptions of CMC as a teaching strategy.*

*One-on-one meetings for teachers served well for introducing CMC, but were not well suited to learning the features of the tool. Workshops tailored to the needs of units are also used. These have helped teachers achieve technical proficiency but the wider implications of CMC, such as appropriate use efficiency/effectiveness issues can be difficult to discuss. The main strategy in use is for teachers to attend one or two half-day workshops during which they learn how to use the tool whilst taking part in a series of verbal and online discussions exploring some of the pedagogical and institutional issues. Development of more tightly focused tailored workshops and of materials for a self-managed learning course is underway, the latter motivated by Salmon's observation (1998) that teachers should 'learn online before teaching online'*

## KEY WORDS

Flexible-learning, CMC, web-based-conferencing, support-strategies, innovation.

## 1. FLEXIBLE LEARNING

In 1996, the Vice Chancellor nominated Flexible Learning as one of four areas of major focus within the university over the next three years. A Strategic Plan for the Support of Flexible Learning was adopted and has been of great use for all of the groups in the university working towards the goals of the plan. By providing detailed examples of how flexible learning can be implemented and supported and the framework for the activities of the many teaching and support units involved in supporting it, a clear focus has been kept on what needs to be done and why.

The definition of flexible learning in use at this university is :

> "flexible learning is the name given to a variety of teaching, learning and administrative practices which meet the needs of a diverse student population in the contemporary social context" (UTS 1997)

Flexible learning is seen university-wide as a strategic initiative and a much thought has been given to providing an environment that encourages staff to take up flexible learning practices. By providing a range of exemplars of flexible learning practice, and ways to support these practices, the strategic plan has given many teachers the confidence to adopt flexible learning practices in their teaching.

Six task force groups were established to review ways in which flexible learning could be operationalised. One of these groups, the Flexible Learning Action Group on internet use or FLAG, investigated ways in which the internet could be used to support flexible learning. The FLAG group is a peer group open to all staff with an interest in its activities. Several staff from the Institute for Interactive Multimedia (IIM) are regular participants, and the Director is the chair of the group. Recommendations and decisions made by FLAG are arrived at through an informal consensus and it is this group that provides the direction for the strategies supporting flexible learning described in this paper and carried out by IIM staff and others.

## 2. WEB-BASED CONFERENCING

The FLAG group investigation began by looking for ways that teachers could do something more with the internet than just using it to hold lecture notes and pictures. Several of the people within the FLAG group had experience with a number of the conferencing tools available at the time and some were already using them in their teaching. These conferencing tools, some of them web-based, are examples of computer-mediated communication or CMC.

CMC was seen as an important tool in the flexible learning plan for a variety of reasons, including:

- It can be used to extend teaching in new ways such as online debates, role playing simulations.
- It can be used to reach new groups of students, for example in rural NSW or in Asia.
- Its ability to provide a more individualised learning environment for the student.

The process used to choose TopClass, a web-based conferencing system, as the recommended computer conferencing tool for the university is described in Sawers and Alexander (1998). The FLAG group investigation recommended TopClass as the best way to ensure favourable student and teacher experiences within the resource constraints that apply within the university. Support for the use of TopClass in supporting teaching can be found in Kiser & Torecki (1997).

The effectiveness of CMC as a teaching strategy will not be addressed in this paper although some of the references used here do look at this, in particular Freeman (1997, 1998) and, more obliquely, Chickering and Ehrmann (1997).

The use of TopClass at the university has grown from one subject with less than a hundred students in each semester of 1996, to 2 subjects with several hundred students in the following semester, to about 30 subjects and 3000 students in spring 1997 to more than 6500 students in 80 subjects across 8 faculties in autumn 1998. The takeup of CMC at UTS far exceeded the expectations of the FLAG participants.

Strong links between the UTS Strategic Plan, the strategies mapped out by FLAG to support flexible learning and the activities used to introduce CMC have been a major factor contributing to the successful takeup of CMC. The participation of educational innovators such as Mark Freeman and James Sawers in FLAG has been of great value in suggesting effective ways in which the introduction of CMC could be supported across the university.

Theories of the diffusion of innovations provide another view and links will be made between the UTS experience and between the stages of adoption and the characteristics that control the rate of adoption outlined in Rogers' theory (1995).

## 3. EDUCATIONAL INNOVATION

William Geoghegan, in a seminar at UTS in 1996 presented a review of the history of the 'instructional technology revolution.' (Geoghegan 1996). Drawing on work by Moore (1991) and Rogers (1995) he contrasted the adoption of instructional technology in its various guises with the more general case of technological innovations. Geoghegan talks of a 'chasm' separating the educational mainstream from the innovators and early adopters who between them total about a third of the community, a chasm that he says will have to be crossed if the long-promised benefits of educational technology are to be realised.

Rogers points out five characteristics of innovations that influence the rate of adoption as well as their eventual success or failure in a community :

- The *relative advantage* of the innovation over what it replaces (in time, cost, effectiveness, quality of results etc)
- The innovation's *compatibility* with existing practices, values, needs, culture, or conversely its disruptiveness
- The *complexity* of the innovation: how difficult is it to learn, understand, and to use effectively
- The innovation's *trialability*; how easy is it to experiment with the new way of doing things before making an adoption decision
- The *observability* or *visibility* to other potential adopters of the results achieved by using the innovation

  (Rogers 1995)

Connections between these points and our strategies are many and are documented below.

Geoghegan sees evidence that the chasm is being crossed in some areas and raises a number of questions about the support that will be necessary if the mainstream educational community adopts innovative practices like CMC. The strategies employed at UTS are directly related to several of Geoghegan's points and are detailed below.

## 4. UNDERLYING ISSUES

Freeman has argued that the success he has had from using TopClass is because of the rethinking of his teaching, and the integration of TopClass into his subject as just one of a number of learning resources for his students.

> "If the aim of introducing technology is to enhance student learning outcomes, then the technology must be designed so as to encourage students to take a deep approach to learning. For this to be possible, teachers' conceptions may need to change from one of information transmitter towards facilitating changes in student conceptions of their subjects. Educational technologies therefore do not remove the role of the teacher as the primary facilitator of student learning and as the designer of the learning environment . . ." (Freeman 1997)

Freeman's conceptualisation of the link between teaching and technology has underpinned all of the activities and strategies used to support CMC at UTS. An activate participant in the FLAG groups' activities, his thoughtful and provocative reflections on his experiences as an educational innovator, most recently in a public lecture at UTS (Freeman 1998), provides many of his peers with reassurance that appropriate use of CMC is of significant educational value, linking strongly with Rogers' characteristics of *relative advantage* and *observability/visibility*.

The experience of the author is that some staff see CMC as being useful primarily as a way of replacing something; for example paper, by putting course outlines and lecture notes 'up on the web', or face-to-face interaction such as lectures or tutorials with online versions of face-to-face strategies. Another conception found is that adding technology into the teaching process will result in 'improvements', often unspecified.

Changing these and other conceptions, many of which can be characterised as 'focusing on the technology rather than the student', is the underlying aim of the strategies used by IIM to support staff adopting CMC. By providing opportunities that cause academics to align their expectations with what is known about student learning, practitioners have a firmer basis on which to proceed. The institutional context in which flexible learning practices are being encouraged is most relevant here and the strategic plan provides many ways to proceed. For instance, academics must demonstrate some way in which they have adopted flexible learning practices in their teaching as a criteria for promotion, a strategy that rewards staff who make the effort.

Learning about the technology of CMC, for example sending a private message in TopClass, is a small part of the larger problem of how best to utilise CMC. Of more significance is having a pedagogical framework in which to think about CMC and to understand why the adoption of CMC will entail a change to teaching practices. A technique used throughout the support program is to challenge staff to think about their conceptualisation of CMC and their motivations for using it in their teaching. A failure to deal with issues such as this is identified by Cummings (1995) as contributing to faculty resistance to technology based innovation. The main questions posed, and the links to Rogers' characteristics of innovation are given in Table 1 on the following page.

This technique of challenging expectations and beliefs is supported by Tillema (1995) who finds that 'the knowledge structures of professionals are very difficult to change by mere presentation of information. 'The concluding comments in Andrews' report speaks of the need to relate pedagogy to technology and of the need that staff have for assistance 'in coming to grips with effective selection and use of technology in teaching and learning' (Andrews 1996).

## 5. SUPPORT STRATEGIES

A range of support strategies are used in different ways and at different times to improve the chance of meeting teachers needs in a way that is effective for them.

### 5.1 ONE-ON-ONE

One-on-one sessions are extremely useful for eliciting expectations, often naïve, of what is entailed in CMC by stepping through some or all of the questions listed in Section 4 above, and are used to frame the next step for teachers to take. These meetings have been used extensively since the start of the flexible learning program. A typical session of 90 minutes is conducted in front of a computer which allows demonstration of features of the software if appropriate. For staff with little knowledge of the web or of CMC a demonstration of the capabilities of the software can be an effective way of conceptualising what they will need to learn and use. For more technically proficient teachers a one-on-one meeting is often all they need to get started. These staff are usually happy to go off on their own and teach themselves all that they need to know about TopClass. For other staff, learning how to use TopClass as well as learning about the surrounding issues of CMC is too much for one meeting.

**Table 1**

Challenge Questions and Rogers' Characteristics Influencing the Rate of Adoption of Innovation.

1 = *Relative advantage*, 2 = *Compatibility*, 3 = *Complexity*, 4 = *Trialability*, 5= *Observability*

| Challenge question | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| *Is the focus on the student or the technology?* Digitised video clips, java applets and other advanced components don't necessarily improve student learning and can be very costly to implement. The suggestion is to 'keep it simple'. Complex implementations will be resisted by the mainstream and may just get in the way of student learning. | | | x | | |
| *Is the use of CMC appropriate in your subject?* Students without a computer at home won't find web-based conferencing of much use if they have to use busy computer labs. Requiring students to post assignments through TopClass simply for administrative convenience may just be transferring the burden of administration from the teachers to the students. Staff could use TopClass for a component of their subject rather than having to commit to an all or nothing approach. | x | x | x | x | |
| *If what you're doing works now, then why are you considering a change?* Keeps the focus on the student. There may be cogent reasons for taking up CMC but at the very least it should enhance student learning, a point made explicit in the strategic plan. Repackaging of materials or practices from one medium to another is pointless if what is already in place is effective. This question is used to explore the perception that adding technology must improve (or degrade) a students experience. TopClass doesn't have to be used for everything. | x | x | | x | |
| *Will you be creating extra work for yourself, your students or support staff?* Providing web-based lecture notes (in addition to the paper-based notes) is extra work for someone. Are teachers adding to their workload by trying to run an online course as well as the face-to-face course? Teachers will often need assistance provided by support staff in setting up their courses. Are support staff being asked to do this as additional work? | x | x | x | | |
| *Is the issue specific to CMC?* New problems and issues arising from CMC often turn out to be familiar problems and don't require extra work. Policies and procedures may already be in place and they can be utilised. Online harassment of students or teachers, and access and equity issues are examples. | | x | | | |
| *Do you see CMC as replacing or supporting what you do now?* At UTS, CMC use is seen as supporting current teaching practices rather than replacing them. Staff who are wary of moving into CMC because of the difficulties they may face (will the technology work?, how much extra work will be needed?, will the students benefit?) are encouraged to use it in one area or with a small group as a way of experiencing it but without having to commit too much time or effort. | | x | x | x | |
| *Have you considered a pilot project?* A small scale run is an excellent way of reassuring teachers (and students) by allowing them to try CMC out in a way that gives them time to see what needs to be done and to reflect on experiences. Student evaluation of small scale uses will allow the lecturer to see direct evidence of CMC's effectiveness. If they decide not to proceed as a result of these experiences then that is probably the best outcome from the teacher's and the student's point of view. Several teachers at UTS have tested the waters out this way. CMC, like any other teaching strategy, is not applicable in every situation. | | x | x | x | x |
| *Synchronous versus asynchronous strategies.* CMC is not a synchronous teaching strategy like a lecture or a tutorial. Effective use of CMC requires different strategies to those that apply to lectures and tutorials. Video-conferencing, often imagined as a compelling resource for use in CMC, is really a way to reproduce a same-time, same-place strategy (a lecture) with a same-time, different-place strategy. CMC is a different-place, different-time strategy. | x | x | x | x | |

The benefits of this focused approach, such as being able to focus on material and strategies relevant to the teachers skill level and discipline area, and conceptions of CMC, must be contrasted with the demands, such as time, that are placed on the guide. In the initial stages of the implementation of TopClass demand for help from teachers already using TopClass was very high and the most effective way to respond was a one-on-one meeting.

Whilst the number of these sessions has decreased in recent months, they remain a powerful way of bringing people into the fold of CMC and of exploring with them the wider implications of the use of CMC to support teaching.

## 5.2 WORKSHOPS

A series of two half-day workshops, 'Introduction to TopClass' and 'Content Creation for TopClass' were designed as a response to the demand for one-on-one meetings. Open to all staff of the university, the workshops have been successful in helping people learn the basic features of TopClass. The course is run by the author in conjunction with a trainer from the central computing unit and covers the technical and pedagogical issues of the use of TopClass. Upon completion staff will have:

- an understanding of the elementary features of TopClass;
- been exposed to some of the pedagogical issues surrounding the use of CMC; and
- an understanding of the administrative and support issues for students and teachers.

About 30 of these workshops have been run in 1998 and about 10 people attend each workshop in the training laboratory of the central computing unit. This laboratory is equipped with mid-range Macintosh computers with add-in Pentium cards capable of running Mac OS or Windows 95, linked to the university's ethernet network and has a good quality data projector.

Material presented within the workshops is targeted at Geoghegan's mainstream user, teachers who must feel confident that what they are taking on won't collapse. The objective of the first workshop 'Introduction to TopClass' is to take staff through to the point where they can do everything that a student would need to do in a subject supported by TopClass. The skills learned allow staff to log in, send a private message, participate in a discussion group and answer a simple multiple-choice quiz. During the class a number of topics, pedagogical, technical and cultural, are discussed, some of them on-line. The artificiality of a same-place, same-time web-based discussion and time limitations prevent reflective on-line debates of these issues. This point is raised in the class and often leads to a vigorous debate. The role of the central units in providing support for staff and students is also discussed.

The second workshop, 'Content Creation for TopClass', had its origins in the demand from academics for assistance in putting copies of paper-based materials, typically subject outlines and lecture notes and so on, into TopClass. In many instances these documents already existed in electronic form as Microsoft Word documents. The process of designing a simple coursework area (similar in concept to a directory structure), converting Word documents in HTML and then uploading the documents in TopClass provides the basis for all subsequent coursework creation involved in preparing a subject supported by TopClass. Several of the underlying issues often discussed here are why is a change to TopClass is being considered?, and whether paper-based notes will be provided.

Formal feedback is solicited for both of these workshops and has led to only minor modification of the workshops. The mix of pedagogical and technical material is generally accepted and many staff have commented that they find learning about CMC by using CMC is an effective way for them to start.

The two workshops have been an integral part of the strategies used by staff to learn the basic features of the tool and have served as the starting point for many teachers adopting CMC.

## 5.3 TAILORED WORKSHOPS

The difficulty that many staff have in arranging time to attend the more general workshops has led to a number of in-place workshops being run for entire units, usually at their request. Attendees have included deans, heads of school, professors as well as the usual gamut of lecturers and support staff. Discussion of the implications of CMC use in these workshops is very effective as it allows staff to see what is entailed in supporting CMC use as well as providing recognition for their support staff and the increasingly important role they play in keeping CMC operational.

Drawbacks to a tailored workshop do exist, however, as it is possible for the agenda to be hijacked in a way that excludes discussion of the some of the major implications of CMC use, which are sometimes seen as not important. In one memorable case the author was told by a senior academic to 'Forget all this pedagogical ****! Just tell me which buttons to press…' Fortunately, this view is not widespread. Andrews in her report provides strong support for the view that teachers in general are very interested in the pedagogical issues of developing material for IT-based delivery (1996, Q 4a)

The most difficult workshops occur when groups of people are attending because they feel compelled to use TopClass for a variety of reasons. Teachers in this category, who are not naturally inclined to adopt innovations such as CMCs, are under some stress and workshops such as these are not an effective way of addressing their concerns.

### 5.4 PEER SUPPORT

As the number of teachers with experience of CMCs grows another strategy to employ is that of peer group support. Faculties and unit are informally encouraged to provide in-house support for staff using CMC. Many staff, new to TopClass, need occasional help, and more frequent assistance near the start of semester as the need to set up courses peaks. Being able to call on in-house assistance is more likely to provide the reassurance and assistance that these staff need.

The role of IIM and FLAG in this area has been to encourage the decision makers to support this approach and to provide extended assistance to the in-house support staff who often take on the role of TopClass administrators within the school or faculty. Geoghegan makes the point clearly when he says that:

> "In contrast to early adopters (whose support networks often extend outside their immediate fields) mainstream faculty tend to look within their own or closely related discipline or profession to meet their support needs." (Geoghegan 1996)

Many units around the university are struggling to provide the resources to support new activities such as flexible learning. Although funding has been provided to each faculty to support the adoption of flexible learning, the reality is that demand for the funds exceeds supply. As a result some staff have extra worked allocated to them, work that is in addition to and not instead of other work. IIM therefore continues to provide direct assistance to many of the teaching staff using TopClass. Units are encouraged to utilise the services provided by the central units and to avoid re-inventing the wheel.

### 5.5 SEMINARS

During the 18 months since the FLAG group started a number of seminars on topics of interest to FLAG have been held. These seminars, open to all staff, serve as a way of making visible to the broader community the work being done by individuals within the CMC community at the university. By presenting their experiences in front of their peers and reflecting on the effectiveness of their use of CMC, practitioners provide a valuable way for prospective users to assess the possibilities.

Over the last year FLAG has held a number of seminars on innovative ways in which the internet, and not just CMC, can be used to extend teaching. One meeting was dedicated to different approaches to online debates with examples from three discipline areas being presented and discussed, and another to an immersive role-play utilising email and web-based video-conferencing.

An upcoming seminar will look at web-based assessment issues, an area of great interest to the CMC community at UTS and elsewhere.

The FLAG seminars aim to model good practice by synthesising the experiences of the CMC community at UTS in a way that encourages the adoption of CMC where appropriate and promotes innovative uses for CMC; uses that do more than require the students to use electronic page turners.

## 5.6 LISTSERV

An obvious way of supporting TopClass users would be to utilise a TopClass discussion group or conference. For a number of reasons this approach has been avoided. These include the fact that a conscious decision has to be made to login to TopClass whereas email just arrives; and using TopClass to discuss TopClass might exclude people who aren't yet comfortable with using TopClass. An informal poll of potential list members showed overwhelming preference for an email listserver, which has been setup. At present there are about 120 subscribers.

Discussion of pedagogical issues, reports on how CMC has been used, technical questions and of the implications of flexible learning are encouraged. The list is also the primary vehicle for communicating administrative information of relevance to all TopClass users, such as scheduled interruption to service for hardware & software maintenance and so on. However, the problems common to many lists, and familiar to all list owners, are present. These include the high number of passive observers, or lurkers, which presents the challenge of sustaining a discussion in a way that does not rely only on the contributions of a few. The volume of messages on this list is low, less than one each day, although the period around the start of semester produces a flurry of questions.

The reality of email is that many people do not read all their mail and a number of problems could have been avoided if people had read their mail. This is not a new phenomenon and getting across the import of relevant information remains a challenge.

## 5.7 ADMINISTRATION

Many innovators and early adopters use their own computers to support technology-based innovations but run into problems as the use grows. The experiences of our innovators confirmed this and planning by FLAG and IIM occurred from the start to implement the TopClass program utilising the expertise of the university's central computing unit, Information Technology Division (ITD). ITD now has responsibility for the TopClass server and all the related aspects required to provide a secure and stable environment necessary for a technology-based strategy like CMC, in use by thousands of students. Network access, database backup and recovery, software maintenance, testing and implementation of new releases, error tracking and reporting, vendor contacts are all handled by ITD.

Registration of students within the TopClass databases was identified by our innovators as a service that, if centralised, would be a great saving in time and effort. ITD responded and an extract of the relevant data from the student records systems is loaded into TopClass upon request. The deficiencies of administrative support within TopClass makes this a non-trivial task. Volatility of student records at the start of semester as students withdraw from, or add subjects, requires the registration process be run about 5 times per subject per semester. Centralising this service has been of enormous benefit to teachers.

Implementation of flexible learning has required cultural and procedural changes in the way that central units work and fundamental changes need time to settle in. ITD has responsibility for all of the university's central computing requirements, but with the TopClass project they are involved for the first time in direct support of teaching and students. IIM staff have spent a lot of time and effort over the last year in guiding and supporting the effort that ITD has made to accommodate and support the flexible learning project at the university. Much of the work of computing units is invisible when things work and too visible when they don't.

## 5.8 TECHNICAL SUPPORT

The need to provide timely support for students using TopClass was of sufficient importance that funding was provided by the university to ITD for an additional person for the help desk. Technical support for staff and students is now available through the ITD help desk from 8am to midnight, and on weekends from 9am to 5pm. An informal aim is that at least 90% of student calls to the help desk should be resolvable on the spot. Being able to refer students to the help desk in the event of network interruptions, forgotten passwords and so on, has been a very positive factor for teachers as it frees them to focus on their expertise – teaching and student learning.

Teachers also use the help desk for technical assistance. If the help desk is unable to resolve their question the call is passed through to IIM. The great majority of calls are responded to and resolved within hours of the initial call to the help desk.

All of these strategies are currently in use, although only the one-on-one sessions and the FLAG seminars have been in use since the start of the flexible learning program. The early days of the program were characterised by short-notice calls for help from teachers already using CMC. In these cases the most appropriate response was a one-on-one session. As the focus moved from those already using TopClass to those considering its use the support strategies evolved to include the workshops, the listserver and the use of the services of the central computing unit.

## 6. FUTURE DEVELOPMENTS

The introductory phase of the adoption of CMC for flexible learning at UTS has come to an end. Evidence for believing that CMC has moved into the teaching mainstream at UTS has been documented above. The focus of support strategies is shifting from a focus on the new user to a tighter focus on project-based activities. Although the author finds workshops to be reasonably effective because of the care taken to relate them to teachers needs, scope for project-based workshops is growing. The need to respond to teachers who have now used CMC for a semester or more, and who are wanting to do something more with CMC is driving the creation of new support strategies.

As increasing use is made of final-year students and part-time tutors to support teachers in TopClass, ways must be found to extend to them the support strategies available to teachers on campus. Development of self-manage learning materials, supported by TopClass is proposed, although concerns for the effectiveness of this strategy need to be carefully examined. The Open University Business School trains all of their tutors online; with student/tutor ratios of 15:1 and thousands of students this approach must work. Salmon makes an interesting point that ‘teachers should learn online before teaching online’ and sees ‘socialisation in the medium of CMC’ as a major focus of this training (Salmon 1998).

## 7. CONCLUSION

The development of a coordinated approach to the implementation of flexible learning has been the key to the successful adoption of web-based conferencing within this university. A variety of strategies is employed to support teachers adopting flexible learning approaches in their teaching. Multiple strategies are used so that the needs of teachers who may respond to only some of the strategies are met.

Strategies that take into account the barriers that prevent mainstream teachers from adopting educational innovations and that are focused on, and draw direction from, the goals of the institution have resulted in the successful use of computer mediated communication to support flexible learning at this university.

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