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First-Year Students' Experiences of Learning and Teaching in the Biosciences

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KEYNOTE AIMS

- ➔ to review the main research findings from a study of three first-year bioscience course units as teaching-learning environments
- ➔ to suggest some implications of the findings for the organisation and management of first-year courses

THE ETL PROJECT (2001-2005)

Enhancing Teaching-Learning Environments in Undergraduate Courses

👉 **aim**

to investigate and enhance the quality of learning and teaching in undergraduate courses, in a range of subject areas and course settings

👉 **funding**

ESRC Teaching and Learning Research Programme

👉 **research centres**

Edinburgh Durham and Coventry Universities

👉 **subject areas**

Biosciences, Economics, Electronic Engineering, History
[Media and Communications]



RESEARCH DESIGN (main phase)

☞ **Samples and settings**

- first- and final-year course units in 12 partner departments

☞ **Data-gathering**

- questionnaires
- interviews with students and staff
- course documentation and data

☞ **Enhancement focus**

- collection, analysis and joint review of baseline data →
→ → evidence-based collaborative initiatives



Key Concepts, 2

TEACHING-LEARNING ENVIRONMENTS

“We have the best anatomy course in the country ...
... What they don’t cover in the lecture or the lab,
they cover in the final exam.”

**A student from a US medical school (Abrahamson, 1978, cited in
Eizenberg, 1998, p.193)**



KEY CONCEPTS, 2 : CONSTRUCTIVE ALIGNMENT

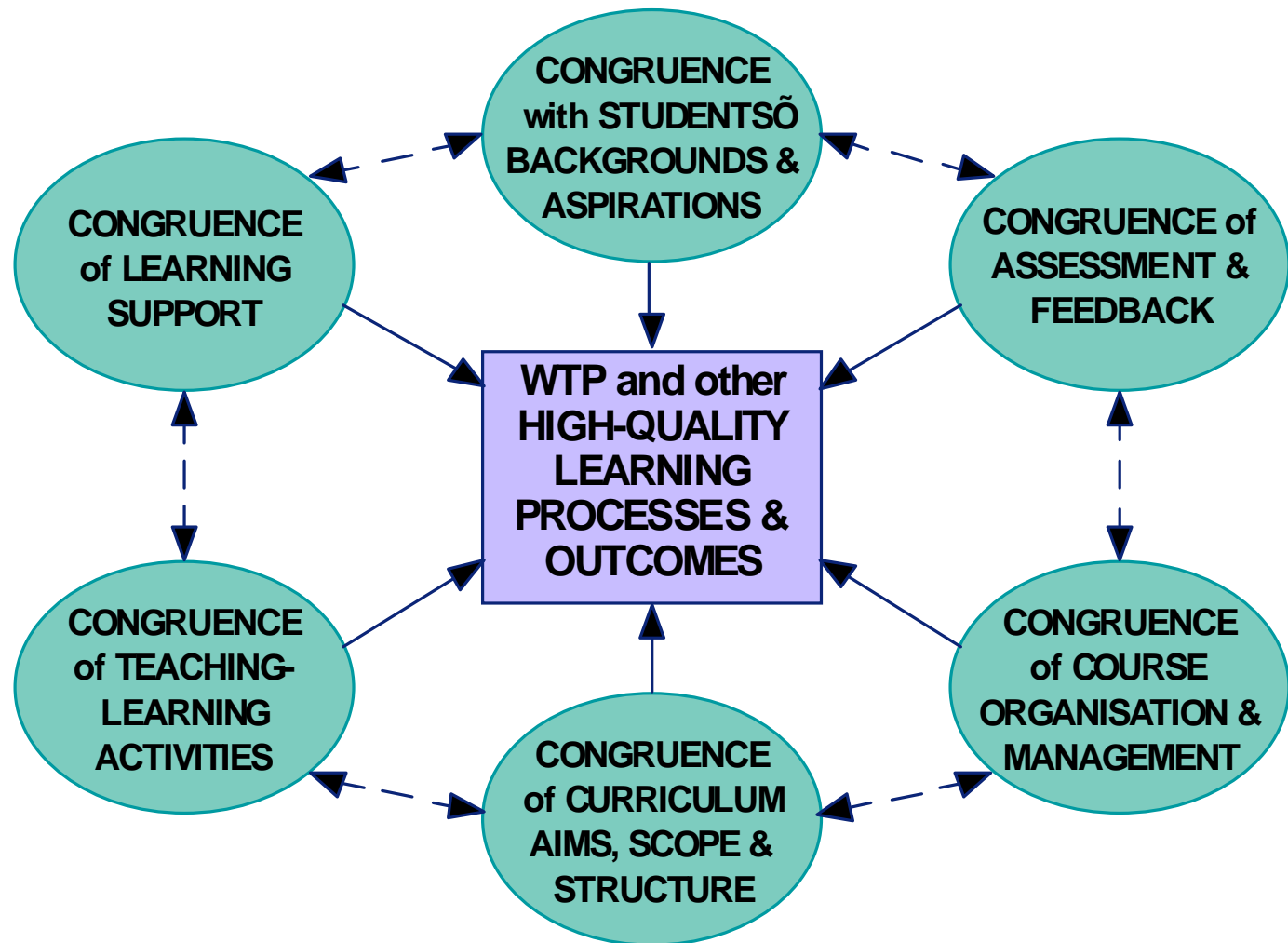
“In aligned teaching, there is maximum consistency throughout the system. The *curriculum* is stated in the form of clear objectives, which state the level of understanding required rather than simply a list of topics to be covered. The *teaching methods* are chosen that are likely to realise those objectives; you get students to do the things that the objectives nominate. Finally, the *assessment* tasks address the objectives, so that you can test to see if the students have learned what the objectives state they should be learning.

All components in the system address the same agenda and support each other. The students are ‘entrapped’ in this web of consistency, optimising the likelihood that they will engage the appropriate learning activities but paradoxically leaving them free to construct their knowledge.”

(Biggs, 2003, p.27 [our italics])



CONGRUENCE IN FIRST-YEAR BIOSCIENCE COURSES: KEY DIMENSIONS





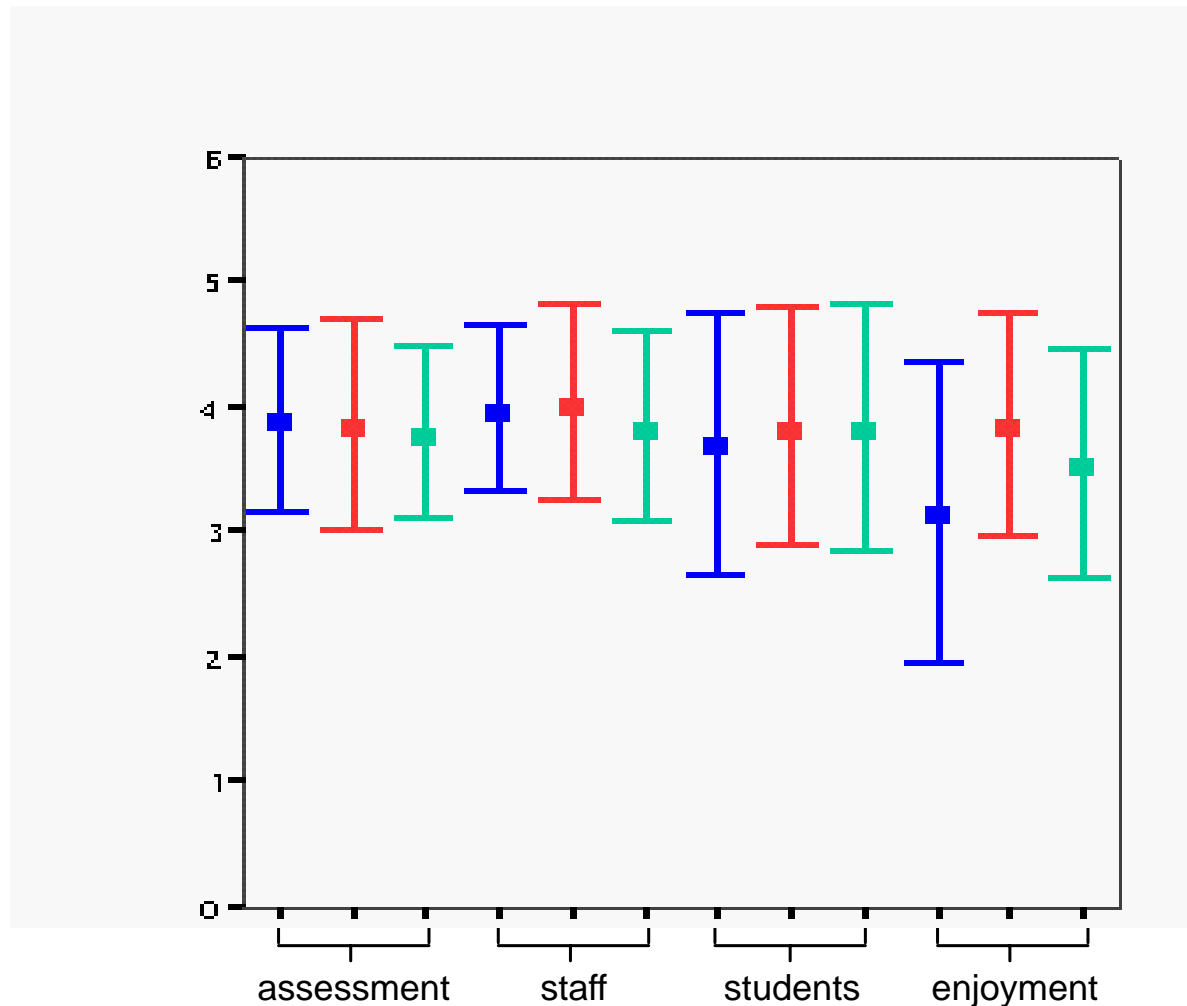
THE THREE FIRST-YEAR BIOSCIENCE COURSE SETTINGS

[see separate handout]

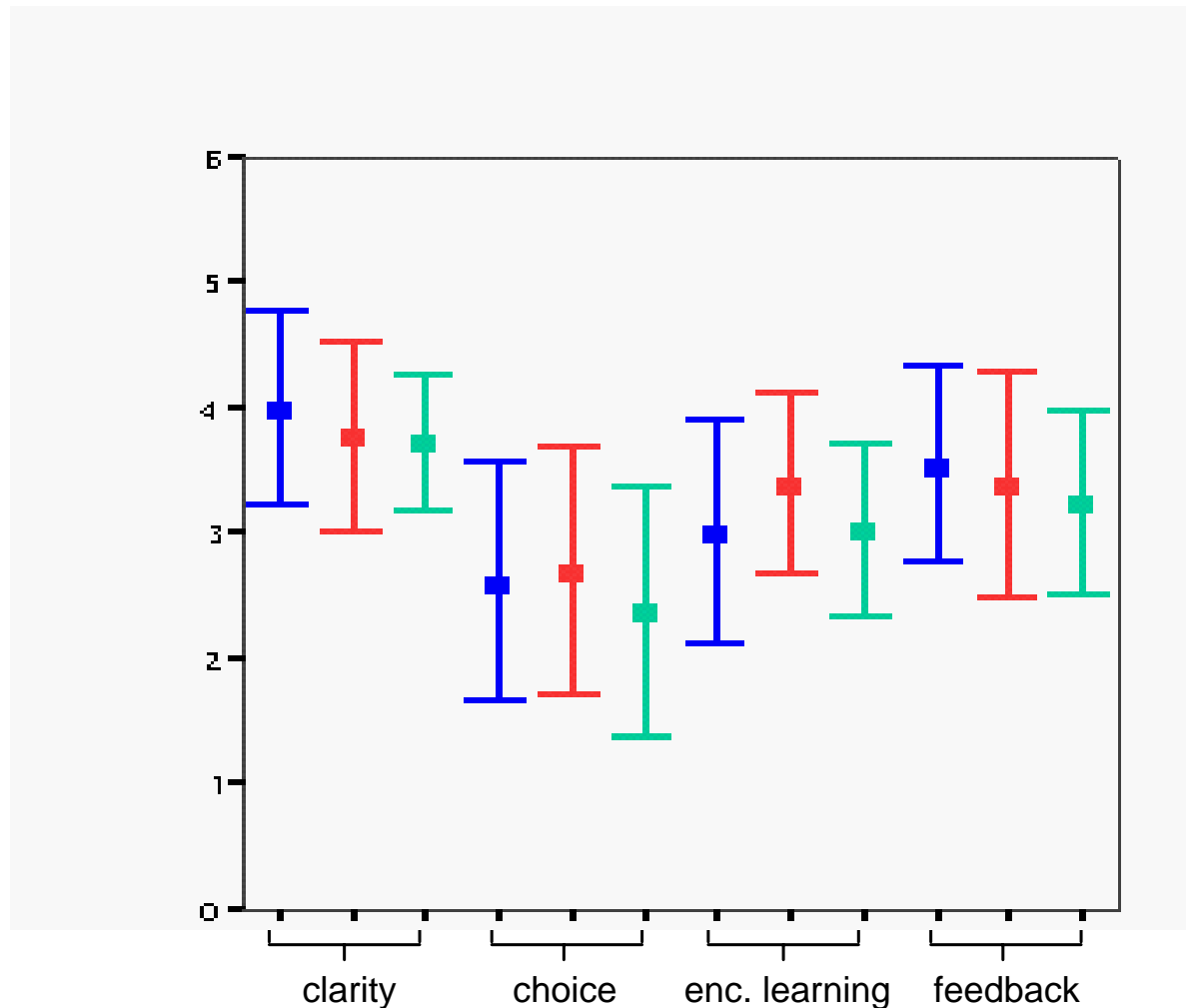
TAKE-UP RATES FOR QUESTIONNAIRES AND INTERVIEWS

<i>unit</i>	B1F	B2F	B3F
<i>year 1</i>			
<i>cour se size</i>	77	638	96
<i>LSQ</i>	33 (43%)	140 (22%)	88 (92%)
<i>ETL Q</i>	43 (56%)	271 (42%)	86 (90%)
<i>LSQ & ETLO</i>	25 (32%)	84 (13%)	77 (80%)
<i>stu dents int erviewed</i>	3	20	10
<i>year 2</i>			
<i>cour se size</i>	107	630	88
<i>LSQ</i>	46 (43%)	472 (75%)	78 (89%)
<i>ETL Q</i>	52 (49%)	273 (43%)	73 (83%)
<i>LSQ & ETLO</i>	33 (31%)	226 (36%)	64 (73%)
<i>stu dents int erviewed</i>	1	11	13

Questionnaire Results, 'Environment' Sub-scales (a), first-year biosciences



Questionnaire Results, 'Environment' Sub-scales (b), first-year biosciences



CONGRUENCE of CURRICULUM AIMS, SCOPE AND STRUCTURE

- ➡ **primary goal in first-year units** (*student & staff interviews*):
a secure grasp of the foundations of the subject, on which to build in subsequent years, with varying emphases on:
 - a firm understanding of fundamental concepts and processes
 - a sense of the breadth and scope of the biosciences as a field of study
- ➡ some staff also spoke (c.f. WTP) of :
 - trying to move students away from a relatively unproblematised view of the subject (assoc. with A-level)
 - encouraging a more questioning approach
 - [espec. in B2F] trying to convey a sense of the breadth of expertise called for in the contemporary academic and professional practice of bioscience, incl. ethical awareness



CONGRUENCE of TEACHING-LEARNING ACTIVITIES

- the lectures and the practicals were favourably perceived by most students
- in B2F, some students questioned the relevance of the skills component of the 'practical-tutorials'
- in B3F, a prime concern was the variability in tutorial provision . . . which in turn raised questions about equity and why good tutorial practices had not been more widely shared



CONGRUENCE of ASSESSMENT AND FEEDBACK

- ➡ In B2F and B3F, formative assessment or assessment-for-learning was the predominant student concern
- ➡ This took various forms:
 - dissatisfaction with the quantity and helpfulness of feedback comments
 - frustration with delays in receiving feedback
 - uncertainty about the ground-rules for buttonholing tutors
 - uncertainty about what staff expected in set work



CONGRUENCE of ASSESSMENT AND FEEDBACK: **Dissatisfaction with Feedback** *(B3F Student Interviews)*

S2: We don't really get feedback on exams - you get a mark - but even in course work you just get a mark and maybe a couple of ticks or (S1: Good) or 'put this in capital letters instead' or something, and that would be it.

S1: You don't really get any feedback on anything.

I: So that must be quite difficult then if you're struggling to figure out what to do?

S1: (Agrees). That's another way it's very different from school. But how did you know what areas to improve?

S2: I didn't really, I just threw everything in and hoped something would be okay.

S1: If it did work, you don't know what it was that worked and what it is you're wasting your time on.



CONGRUENCE with STUDENTS' BACKGROUNDS AND ASPIRATIONS

Transition to university-level study: 'traditional' students

S2: I did Higher Biology so it's kind of like revision for me with a wee bit more added in. [...]

S3: It's quite similar to what I've done in the Higher and I did Advanced Higher as well. [...] I think maybe it's just taking it to a higher level and learning a wee bit more about things that I didn't really know before.

S2: I did Maths, Biology and Chemistry at A level and I think I've tried to carry out my studying in similar ways to how I did it at A level ... it's built on a lot of what I did at A level but taking it much further.

CONGRUENCE with STUDENTS' BACKGROUNDS AND ASPIRATIONS

Transition for 'non-traditional' students

S4: I worked for eight years and then decided to go back to uni. When I came here it was basically hell because I had no Biology and little Chemistry knowledge, so the first term was a bit of a nightmare, much, much more work than I thought was involved. [...] The second term is much better, we actually have got to rely on what we did for the first term, so it's kind of leveled out.

S5: I never really felt I had to work particularly hard at A levels to get quite respectable grades but then I took a gap year and it was spent doing things that were completely different, like looking after kids, or travelling. And then coming here and coming towards exams, you suddenly thought 'Oh no! I actually should have been doing a lot more work!' So that came as quite a wake-up call! [laughing]

S4: I did the French Baccaalaureat, so I had a very big transition from the French system to the English system. I found that there was a lot that they'd covered in A levels that I had never ... So I found the transition really hard and I had to look up a lot of stuff for myself.



CONGRUENCE with STUDENTS' BACKGROUNDS AND ASPIRATIONS

- ☞ Strategies for Engaging with Student Diversity
(all three settings)
- staff approachability and supportiveness
 - a traditional tutorial system
 - group-based work promoting interaction between students
 - a varied range of learning-teaching resources

Strategies for Engaging with Student Diversity: a varied range of learning-teaching resources

S1: There's a great CD[-ROM] that comes with the biology book... It's questions, it's got diagrams, it's got activities, everything, and that's what got me through [the first-semester module]. I mean I hadn't done any biology, and it was through using [the textbook and the CD-ROM] that I managed to understand what I was trying to do. Because to everybody else it came quite easy.

S1: Putting the lectures up on the web afterwards is good, and quite a few of the lecturers have provided example questions, example calculations, which has all been helpful.

S4: When I'm listening to the lecture I don't ... I might not take all of it in. I may understand like the basic idea but afterwards I need to have ... the handouts are such an important part because otherwise you have nothing to look back on.

S1: I check my email every day, and check biology notes maybe once a week. [...] But I do use the internet a lot so ... It's really good actually that the biology stuff is accessible outwith the university.



CONGRUENCE with STUDENTS' BACKGROUNDS AND ASPIRATIONS

S1: I spoke to Dr X and he said that really if you want to do well, then you do need to be working all the time practically and for me, that's just not physically possible. I spend three hours commuting a day and I have a part-time job, so I literally maybe can do ... just nowhere near that! [laughing]

S4: [There are] a lot of international students in the course and a lot of us struggled really hard in the first semester. It was very, very frustrating when we kept hearing all the lecturers saying 'And you will have done this in A level'. [*All agreeing*] We haven't done A level! We get [module] questionnaires all the time and it says 'Was there a good assumption of previous knowledge?' Every time I had to put 'No' because there was a lot of things that I had no clue about

S4: I don't usually ask questions but once I did after the lecture and [the lecturer] half dismissed it saying, um ... well as if it was written there, or that my question wasn't worth answering so ...

I: You felt a bit like, put in your place?

S4: Yeah, and that wouldn't encourage you to keep asking questions.

S1: But with my personal tutor, I mean, you can ask him anything and he's always willing to help, which is really good.

CONGRUENCE of COURSE ORGANISATION AND MANAGEMENT *(Student Interviews)*

☞ Sources of Variation in Course Teams

- Size of team (4 - 40+)
- Make-up of team
 - e.g. mainstream lecturers, associate lecturer-tutors, post-doctoral fellows, postgraduate teaching assistants, learning technologists
- Breadth and focus of effort
 - e.g. concentrated on e.g. a small run of lectures vs. distributed across a large set of classes
- Role differentiation
 - e.g. in teaching, assessment, learning support or course management roles

FOCUS OF EFFORT AND ROLE DIFFERENTIATION IN FIRST-YEAR COURSE TEAMS

		<i>breadth and focus of effort</i>	
		distributed ⇐	⇒ concentrated
<i>role differentiation</i> (teaching, assessment, and learning and technical support roles)	low	B1	B3
	↑		
	↓		
	high		B2

PROs AND CONs OF LARGE AND DISPARATE COURSE TEAMS

➤ Advantages

- breadth and depth of expertise
- capitalising on strengths
- flexibility

➤ Limitations

- distance and impersonality
- lines of communication
- inconsistency in practices
- [lack of] spread of good practices

CONGRUENCE of COURSE ORGANISATION AND MANAGEMENT *(B2 & B3 Student Interviews)*

distance and impersonality

S1: Half the lecturers I probably couldn't recognise them if they walked past me. I wouldn't even say that that person taught me something in biology because the lecturers are constantly changing and you don't get any personal relationship with them.

S4: How many lecturers did we have in that course? Seven, eight, nine?

S3: Loads

S4: So you know, they would come for two or three lectures and then go ... Sometimes I did not even know their name to be honest.

S2: We get these assessments, 'What do you think of this lecturer?' at the end of [the module]. You could hear everyone, sat there in the lecture theatre going 'So which was that lecturer? What did they lecture on?' ... Such a rush of different people.

CONGRUENCE of COURSE ORGANISATION AND MANAGEMENT *(B2 & B3 Student Interviews)*

inconsistent practices

S1: Sometimes they say 'Be more concise' but then another time I thought 'Well, I'll try being more concise this time' and actually I got less for doing that! So then the next time I thought 'I'll go back to my other way' and it worked better! So it's been confusing.

S4: I think every time they are corrected by different people anyway. Some of the correctors have said 'You should do it like this' when the person before had said to do it the other way, so then we get marks taken off because we try to make an effort.

S1: [If] biology is going to be taught through tutorials, I think that it is important that everyone should have the same help because I know it's not fair. It hasn't been mentioned, anything remotely to do with biochemistry in my tutorials, and I see what other people bring home, and they've got practice questions and worksheets, and I think 'Well, can I come to your tutorial?' Because I want to.

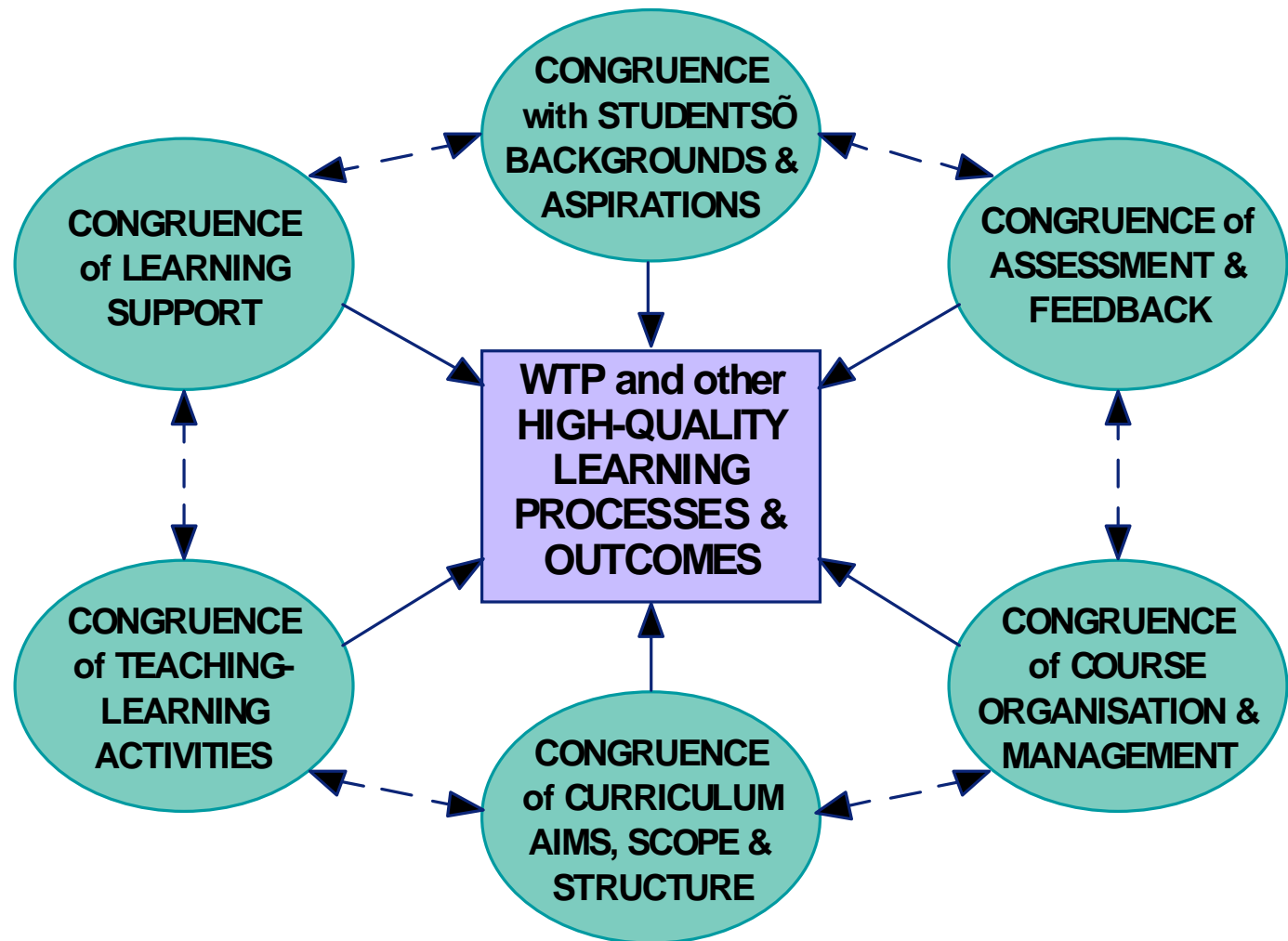


CONGRUENCE of COURSE ORGANISATION AND MANAGEMENT *(B2 & B3 Staff Interviews)*

Team-taught courses have their pluses and minuses. Students are often very worried because they find it hard to carry material over from one lecture into the next. They find it hard to see the thread that runs through the course. If you are aware of that, and you work hard at trying to pull things together, then I think that team-taught courses are very good. [...] But one has to bear in mind that there are cracks between [laughs] that people can fall down.

I guess that's part of the problem from our side. I'm not sure all of us have a complete view of [the course unit]. The course coordinators have to, to some extent, who each have their input to it. I'm not convinced we spend enough time as a body, getting everyone together to review where we are and where we're going. [...] You try to go along to meetings when meetings are called, but you're not always available, and since it's such a large course with so many people, having everyone there every time is not [feasible].

CONGRUENCE IN FIRST-YEAR BIOSCIENCE COURSES: KEY DIMENSIONS





CONCLUDING COMMENTS

Aspects of the first-year courses where congruence was generally high [‘where the shoe fitted well’]

- ❖ staff enthusiasm and approachability
- ❖ blend, variety and integration in teaching-learning and assessment strategies
- ❖ course documentation and linked learning resources
- ❖ groundwork for development of ways of thinking and practising in the biosciences



CONCLUDING COMMENTS

Aspects of the first-year courses where congruence was more problematic [‘where the shoe pinched’]

- *engaging with student diversity*
 - support for students lacking prior subject knowledge
(Hazel & Prosser, 1991; Crawford et al., 1998)

- *the provision of feedback*
 - c.f. Australian First-Year Students Survey/Learning from Subject Review/National Student Survey)



CONCLUDING COMMENTS

- drawbacks of large and role-differentiated course teams

Potential for enhancement

Adapting to the challenges of mass higher education

[much larger intakes, more diverse students, lower unit costs, student self-financing]

- monitoring the experiences of non-homogenous student cohorts
- responsive course management
- course teamwork
- resourcing of first-year teaching