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Comparing the Affective Outcomes of CLIL Modules and Streams on Secondary School Students

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Abstract

Although CLIL streams have shown to have desirable learning outcomes, the less known option of implementing CLIL modules is under-represented in empirical research. This is unsurprising as the guidelines regarding this concept are vague compared to programmes that are already firmly and internationally established making it particularly difficult to investigate. However, studying CLIL modules may offer unknown insights into overlooked effects of bilingual teaching when the selection process of eligible students is ignored. This is particularly true for the attitudinal and emotional level of engagement of the students learning in such a setting. Therefore, the present study looks at affective differences caused by a CLIL stream and module intervention, and more particularly at variations within the CLIL module. Although there are some accounts for expected variation, we find conflicting evidence regarding the benefits of CLIL modules.

Keywords

bilingual education, CLIL modules, CLIL streams, motivation, creaming effect

1. Introduction

Content and language integrated learning, commonly abbreviated as CLIL, stands for the combination of subject matter and language learning. Participating students profit from this method: Not only does it raise cultural awareness (Juan-Garau & Jacob, 2015), students feel more competent in expressing themselves in the foreign language and experience an increase in self-efficacy and a decrease in language anxiety (Ohlberger & Wegner, 2019). While these benefits are usually found in CLIL streams, which consist of a profile class¹ with different subjects taught mainly in a foreign language and which have been focused on mostly for CLIL outcome studies, CLIL modules are not as widely implemented or simply less visible because they need less official sanctioning than CLIL streams. Other than CLIL streams, modules are the short-term version of bilingual teaching and their application in different teaching units as well as their duration are subject to teacher engagement (Richter, 2004, p. 6; Elsner & Keßler, 2013, p. 20).

The general problem of researching CLIL comparatively lies in the fact that there are varying types of realisation under the same label. This applies even more to CLIL modules, as they are less tightly regulated than CLIL streams, even within individual countries

¹ Profile class refers to a class that can be chosen by students with different emphases, such as a foreign language profile, an arts profile, a P.E. profile and the like.

or federal states. Thus interpreting and generalising research results becomes more difficult, but nonetheless offers some compelling insights. Previous findings show that students in CLIL modules benefit from contextualised language learning (e.g., Costa & D’Angelo, 2011; Verriere, 2014; Rodenhauser & Preisfeld, 2015; Meyerhöffer & Dreesmann, 2019) irrespective of linguistic and cognitive prerequisites.

2. Conceptual background

2.1 CLIL in Germany

Bilingual education (used synonymously with CLIL) has been heavily researched (e.g. Fehling, 2005; Abendroth-Timmer, 2007; Zydati, 2007; Osterhage, 2009; Dallinger, Jonkmann, Hollm & Fiege, 2016; Piesche, Jonkmann, Fiege & Keßler, 2016; Rumlich, 2016 for the German context, e.g. Dalton-Puffer & Nikula, 2006; Seikkula-Leino, 2007; Lasagabaster, 2008; Sylvén & Thompson, 2015; Lancaster, 2018; Madrid & Barrios, 2018 for international findings), although recent developments to optimise programmes regarding organisation, school types² and subjects are continuously being debated. In Germany, CLIL originated in the post-war 1960s when a resolution was passed for France and Germany to cooperate more closely. As a result, bilingual programmes were established along the French-German border and German students learnt French in combination with other subjects (Ohlberger & Wegner, 2018, p. 46f.). With the founding of the European Union in 1993, English gained evermore importance, as the White Paper (1995) emphasised the necessity of being able to speak two foreign languages additionally to one’s mother tongue (2+1 language policy, Dalton-Puffer, 2011, p. 184f.). Since the year 2000, bilingual programmes in Germany have expanded even more with many schools now offering CLIL programmes in different languages and formats, with 80% of them utilising English (KMK, 2013; MSW NRW, 2011; Wolff, 2013, p. 21).

2.2 Differences between modules and streams

CLIL is commonly split into two different forms, namely streams and modules, although the majority of school programmes in Germany are organised as streams. This format is comparable to profile courses, where students are selected in virtue of good marks and motivation or a special interest in languages. Moreover, as streams are commonly offered at grammar schools, participants “tend to come from socio-economically strong backgrounds” (Hüttner, Dalton-Puffer & Smit, 2013, p. 272). Apart from additional preparatory language lessons before the CLIL programme starts, content subjects taught in CLIL streams consist of a supplementary weekly lesson, at least in the German model.

The imbalance between CLIL stream students and their non-CLIL peers is further enlarged as the CLIL students “continue to receive the same EFL”³ teaching (Hüttner, Dalton-Puffer & Smit, 2013, p. 272) as their peers on top of their CLIL lessons.

² In Germany, students are separated after four years of primary school, choosing different kinds of schools according to their level of ability.

³ English as a foreign language, denoting regular language classes in the school context.

CLIL teaching usually takes place in parallel in two to three subjects, and these may change from term to term. The target language, which is often English, is used as a vehicle to teach the content knowledge and skills of the regular course syllabus. Since the focus is explicitly on content and not on language, it is acceptable to use the L1 (learners' first language or school language). After all, bilingual education should not solely teach the usual content in another language (Marsh, Masland & Nikula, 1999, p. 36; Ohlberger & Wegner, 2018, p. 47-48), but foster a "double subject literacy" (German term: *doppelte Fachliteralität*, Diehr & Frisch, 2018, p. 245).

CLIL modules, on the other hand, are flexible and temporary. They are offered for a short-term period, which can range from just a few lessons to complete thematic/didactic units over the course of several weeks. Teachers are free to pick a particular unit, but it is important to select the topic with care. It is often thought to be advantageous if the topic is connected directly to the target language on a cultural level (adhering to the 4Cs model by Coyle, 1999). An example in the realm of biology would be to point out cultural differences in the necessity of vaccination programmes depending on regional infection rates.

The most striking difference is that modules are offered to the whole class without leaving individual students the choice to drop the module, while CLIL stream students deliberately choose the CLIL programme. CLIL module groups thus comprise of a heterogeneous group of students with unique preconditions, and it is therefore advisable to discuss the introduction of such modules with participating students beforehand. Apart from the congruent willingness for such an intervention, it is recommended that both the students and the teacher have a good command of the language, particularly since the additional language lessons for CLIL streams do not apply to the module format. When compared to CLIL streams, the foreign language level in CLIL modules might be slightly lower, but can nonetheless be supplemented with appropriate material (*scaffolding*), whereas linguistic demands in CLIL streams can be higher as students are accustomed to using the foreign language in contexts (see Tab. 1 for a comparison of bilingual streams and modules).

Table 1. Comparison of bilingual streams and modules (Krechel, 2003, p. 194f.).

	Streams	Modules
Extent	Spans several school years, usually starting in year 7	Epochal, covering 2-20 lessons (usually limited to one unit)
Access & Participation	(Usually) students apply with good marks and high levels of motivation → mode of selection, profile class	All students in a class
Preparation	Two additional foreign language lessons in years 5/6; often schools with a language profile	No specific linguistic preparation; testing option for students and teachers

School type	Predominantly grammar school (<i>Gymnasium</i>)	Not restricted
Subjects	Traditionally social studies, history and geography, although more courses are being offered	Every subject can be used, sometimes in the form of project days/weeks or after-school clubs

CLIL streams are criticised as elitist because students are preselected (van Mensel, Hilgsmann, Mettwie & Galand, 2019; Bruton, 2011, 2015; Rumlich, 2016). In one study, it was shown that CLIL stream students in Belgium tend to come from families with a higher SES⁴ and are raised in two-parent households, with only 8% of these students repeating at least one school year (as opposed to 25% in the non-CLIL group). They also display slightly higher non-verbal intelligence scores (van Mensel et al., 2019, p. 7/10). CLIL modules present a far more “inclusive, unifying and democratic instrument” (Costa & D’Angelo, 2011, p. 10). It has been suggested that CLIL should be expanded to include all students and should not promote inequality (van Mensel et al., 2019, p. 11; Wattiez 2006, as cited in van Mensel et al., 2019, p. 3). Using the CLIL module approach circumvents this so-called *creaming effect*, meaning that only top students have access to regular CLIL programmes and it is thus not surprising that learning outcomes and motivational and attitudinal values in CLIL streams often differ significantly from groups consisting of non-CLIL students at the same school (Küppers & Trautmann, 2013, p. 291; Rumlich, 2016, p. 89).

2.3 Main characteristics of students in different CLIL formats

Depending on the CLIL format that is offered at different schools, participating students usually differ in terms of their motivational levels, their perceived self-efficacy and language anxiety. Just as in any comparative school-based study, student characteristics vary in a number of other domains as well, which, however, are not the focus of this article.

2.3.1 Motivation

Learning behaviour is often associated with motivation, which is linked to interest in different school subjects. While many subjects suffer from a general decline in interest throughout students’ school career, this is not the case to the same extent in Germany in the subject English (e.g. Krapp, 1998; Löwe, 1987; Daniels, 2008). The inclusion of English into regular subjects may, therefore, be one possible way to circumvent the general trend in subject interest decline (Rumlich, 2014, p. 90).

Besides commonly postulated language benefits that include enhanced vocabulary knowledge (e.g. Admiraal et al., 2006), increased reading and listening competencies as well as a heightened language awareness (e.g. Lasagabaster, 2008; Nold et al., 2008;

⁴ Socio Economic Status

Zarobe, 2008), various studies have found instances of CLIL positively impacting student motivation (e.g. Seikkula-Leino, 2007; Doiz et al., 2014; Lasagabaster & Lopez Beloqui, 2015; Sylván & Thompson, 2015; Madrid & Barrios, 2018).

CLIL programmes are often chosen out of extrinsic motives such as the necessity of language competence for students' future careers and the ability to adjust to challenging situations in a globalised world. Doiz, Lasagabaster and Sierra (2014) found that extrinsic motives had a strong impact on students' learning behaviour (p. 210), while Fernández Fontecha and Canga Alonso confirmed that extrinsic language motivation was higher than intrinsic language motivation in both CLIL and non-CLIL students (p. 25).

Another reason for the motivational effects of CLIL is that language acquisition is contextualised and linguistic correction is kept to a minimum, since subject content is intended to dominate the CLIL lessons. However, such positive results should be interpreted with caution as they may not be caused by the concept of teaching content through and with a foreign language, but instead the change in teaching methods that occurs with it (Rumlich, 2014, p. 80). It should be noted that most research in Germany is done on CLIL streams, which consist of a highly select group of motivated and top-performing students (*creaming effect*, Bruton, 2013, p. 594; Küppers & Trautmann, 2013, p. 291; Rumlich, 2016, p. 89).

2.3.2 Self-efficacy

Self-efficacy describes someone's belief that they will achieve a goal based on their own capability, which can influence feelings, thoughts, motivation and behaviour (Bandura, 1994, p. 71). In school, this construct investigates how certain students feel about their ability to complete challenging tasks (Schwarzer & Jerusalem, 2002, p. 35; Jerusalem, 2016, p. 169). Self-efficacy is not the same thing as self-concept, which decreases over time as students compare themselves to others. Self-efficacy, on the other hand, does not change as a function of social comparisons; it increases over a student's school career and is rather flexible (Donat, Radant & Dalbert, 2008, p. 181f.; Jansen, Scherer & Schroeders, 2015, p. 14).

While academic success positively influences one's perceived self-efficacy, negative emotions such as stress, anxiety and fatigue have detrimental effects (Pietsch, Walker & Chapman, 2003, p. 590; Donat, Radant & Dalbert, 2008, p. 182). Students with high levels of self-efficacy actively participate in lessons and exhibit a better overall performance when compared to students with lower perceived self-efficacy (Donat, Radant & Dalbert, 2008, p. 183). Bandura (1993) and other researchers (e.g. Jaekel, 2018, p. 7; Jansen, Scherer & Schroeders, 2015, p. 13) suggest that self-efficacy is one of the most crucial psychological constructs when predicting students' success. The "interaction between self-efficacy and achievement was significant" and reported to be the highest for foreign language courses (Çikrikci, 2017, p. 105). This was also shown in Jaekel's study, as he found that self-efficacy had a large positive effect on linguistic performance, which is critical as CLIL stream students tend to have higher levels of self-efficacy than their non-CLIL peers (Jaekel, 2018, p. 16f.). Even though one cannot say that self-efficacy beliefs override actual ability, these beliefs "help determine what people will do with the knowledge and skills they possess" (Pajares, 2005, p. 342).

2.3.3 Language anxiety

Anxiety is commonly classified into *state* and *trait* anxiety, with the former kind being a momentarily perceived emotion and the latter type being of a more constant characteristic (MacIntyre, 1999, p. 28; Tóth, 2010, p. 6). *Foreign language anxiety* is further categorised as *situation-specific anxiety* (Huang, 2012, p. 2), as students sometimes feel uncomfortable in different situations of the language acquisition process (e.g. speaking and listening), resulting in insecurity and frustration (Dewaele, 2007, p. 392). Reasons for language anxiety can be oral and written exams, peer evaluations or teaching methods, which can lead to a weak school performance and a negative perception of one's own language competencies (MacIntyre, 2017, p. 17).

In CLIL language acquisition occurs in a more casual atmosphere when compared to traditional language lessons. Overall, Pihko (2007) found that there are a large number of students that feel highly anxious, especially in oral communication (34% in EFL and 30% in CLIL contexts). On one hand, the study reported that CLIL students experience less anxiety than students in a regular EFL class, both in terms of general foreign language anxiety and speaking foreign language anxiety. On the other hand, CLIL students reported more anxiety and stress in their CLIL lessons than their English lessons, which could be a result of the linguistic and lexical demands in a wide variety of topics. Although using a foreign language seems to take a lot of effort, the CLIL students are generally more willing to communicate publicly in the foreign language, even during their teenage years when linguistic confidence is low. (Pihko, 2007, p. 134-138)

Besides the common conception of CLIL students being less anxious, some studies report mixed results. One study found that CLIL students did not even have to be in the CLIL stream for a very long time in order to experience less anxiety (Thompson & Sylvén, 2015, p. 14). However, another study did not find significant differences regarding anxiety in CLIL and non-CLIL students (Doiz, Lasagabaster & Sierra, 2014, p. 216). One can therefore assume that anxiety is context-based and differs according to the student group analysed.

3. Study

3.1 Sample

After the elimination of incomplete data sets, there were a total of 266 students attending 10th grade grammar schools in Bielefeld (NRW, Germany). The CLIL module group consisted of 183 students from 12 classes in two different but close-by schools in the city of Bielefeld, and the stream group consisted of 83 students from four courses in another two schools in adjacent cities. Student socio-economic background was comparable irrespective of group affiliation. Student age ranged from 14 to 17 years (mean = 15.71 years), with more girls in CLIL streams (56.6% female, 43.4% male), but an almost even distribution in the module group (51.1% female, 48.9% male).

3.2 Intervention

Both groups participated in the same two bilingual units in biology, discussing enzymes (*What is the function of enzymes? Where do we find enzymes? Which influence do pH, temperature and substrate concentration have on enzyme activity? How can enzyme activity be regulated?*) and energy metabolism within the context of physical activity (*How is the body supplied with energy? How do muscles work? How can we enhance our performance?*). The module group had never encountered CLIL teaching, while the stream students had previous CLIL classes, dismissing the novelty effect. After roughly 10-12 lessons (spanning about 4-5 weeks) in the first CLIL unit, the module group continued their regular biology lessons in German and then took part in a second CLIL unit of roughly the same extent. The stream group took part in both units but continued their bilingual biology classes between them (see Fig. 1).

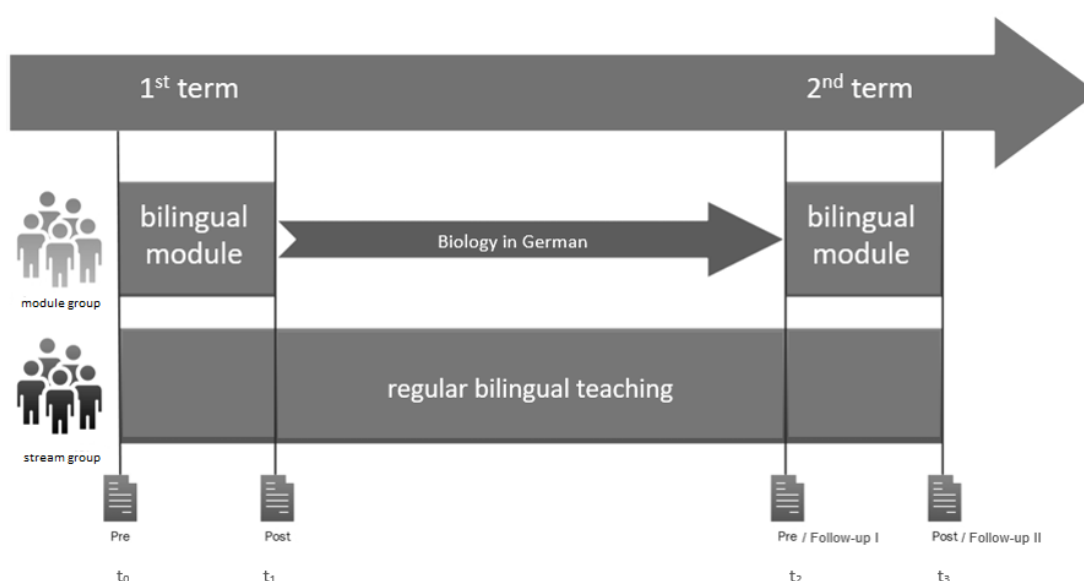


Figure 1. Study design indicating points in time when the questionnaire was employed.

The CLIL module group was taught by student teachers who had studied the subjects English and biology⁵, as the students' regular teachers did not feel capable enough to teach subject matter in a foreign language. Obviously, this change of teacher has to be considered in the further analysis.

As the module group students had not been exposed to CLIL modules before, they were granted additional scaffolding material and offered all materials in German and English to support learning of complex subject-specific terminology (MSW NRW, 2011; Preisfeld,

⁵ In Germany, teachers are required to study and teach two subjects, and for CLIL teachers, one of the subjects should ideally be the foreign language. Note: this is not the case for the majority of the other European countries, accounting for yet another difficulty of CLIL implementation (see Bruton, 2013, p. 594).

2016, p. 103). More specifically, consolidation phases at the end of a lesson were conducted in both the L1 and L2 to prevent misunderstandings caused by using the foreign language (MSW NRW, 2014; KMK, 2013). They were also provided with an additional document in English, which contained useful phrases for describing diagrams and terms to use in discussions and presentations. Dictionaries could be used at any time. Even though the new teaching situation seemed difficult for the first few lessons, the German material was rarely used. When designing a poster on Orlistat, a diet pill exemplifying enzymatic inhibition, 90% of the posters were created and presented in English with only a few that needed assistance from the teacher or classmates.

3.3 Test instrument

A quantitative questionnaire was used to survey student opinions about their biology and English lessons on an affective level and was given before and after each module (see Fig. 1). Module group students were longitudinally analysed (lasting approximately 4-6 months) and those who participated in both modules were given a total of four questionnaires ($t_0 - t_3$). Stream group students only completed two questionnaires, since the results showed very little variance in their scores and the study administrators did not want to distract the students from their lessons more than necessary.

The questionnaire comprised mostly of closed questions and answers were indicated on a six-point Likert-type rating scale (1 = strongly disagree to 6 = strongly agree). Questions were provided on interest, intrinsic and extrinsic motivation for both biology and English in school, with an expanded section on English disinterest and language anxiety (see Tab. 2). Scholastic self-efficacy questions combined both subjects by including an assessment of the increased challenge that CLIL poses. Further, students were asked to give their English and biology marks and to state which of the subjects English and biology they liked better or whether they liked both equally strong or not at all. Due to the theoretical proximity of interest and intrinsic motivation, the index variable *affinity* was calculated based on the mean values of the two constructs. Additionally, sociodemographic data was surveyed.

Table 2. Overview of constructs with sample items (in parts translated from German) surveyed in the questionnaire, also indicating the items' sources as well as the Cronbach's α values.

Construct and sample item	Source	Cronbach's α
Interest Biology <i>I find biology exciting.</i>	Wegner, 2009	.866 (n = 304)
Intrinsic Motivation Biology <i>I study biology because I find the content very important.</i>	Wegner, 2009	.848 (n = 313)
Extrinsic Motivation Biology	Wegner, 2009	.689 (n = 311)

<i>I study for biology because I want to succeed in class.</i>		
EFL Interest*	Rumlich, 2016	.888 (n = 311)
<i>I am almost always looking forward to English.</i>		
Intrinsic Motivation English	Noels et al., 2000	.877 (n = 304)
<i>I like learning English because I enjoy learning new things.</i>		
Extrinsic Motivation English	Doiz et al., 2014	.705 (n = 302)
<i>Learning English is important for me, because it will help me find a job in the future.</i>		
Anxiety English	Doiz et al., 2014	.852 (n = 319)
<i>I am more anxious and nervous in English than my other classes.</i>		
Amotivation** English	Noels et al., 2000	.833 (n = 315)
<i>I don't understand why I have to learn English because I do not care about the language.</i>		
Scholastic self-efficacy	Jerusalem & Satow, 1999	.824 (n = 283)
<i>If I am determined, I can solve even the most difficult tasks in class.</i>		

* Interest in English as a foreign language

** Due to the theoretical closeness, amotivation is presented as disinterest in this article; also see Dörnyei & Ushioda, 2009, p. 298.

4. Hypotheses

Taking into account student differences in CLIL streams and modules, this study aims to explore the possibility that experiencing two bilingual modules could have the same positive effects on learners that are usually attributed to being in a CLIL stream. Although group differences are of interest, changes within the module group are also worth noting. Groups are compared before module intervention (t_0) and after the completion of two CLIL modules (t_3 , see Fig. 1).

I. Motivation/interest

In order to estimate positive attitudes towards the intervention, the scores of intrinsic motivation and interest were calculated as an index variable called 'affinity' (for more detail, see chapter 3.3). This was done for both English as the foreign language and biol-

ogy as the subject that was taught in a CLIL setting. As the module students did not willingly choose CLIL, motivational scores for English are presumably lower when compared to the stream students, but not necessarily for biology.

I.a) CLIL module students show significantly lower levels of English affinity when compared to CLIL stream students at t_0 .

I.b) There are no significant differences in biology affinity between CLIL module and CLIL stream students at t_0 .

I.c) CLIL module students show significantly higher levels of disinterest in English when compared to CLIL stream students at t_0 .

I.d) CLIL module students show significantly lower levels of extrinsic motivation for English when compared to CLIL stream students at t_0 .

I.e) There are no significant differences in English affinity between CLIL module and CLIL stream students at t_3 .

I.f) There are no significant differences in biology affinity between CLIL module and CLIL stream students at t_3 .

I.g) There are no significant differences in disinterest for English between CLIL module and CLIL stream students at t_3 .

II. Anxiety

As the CLIL modules will use other kinds of foreign language than regular foreign language classes, students are presumably more anxious before the intervention starts. However, due to becoming familiar with this type of lesson and making use of the scaffolding material, there will be no significant differences between module and stream students regarding anxiety in the follow-up investigation.

II.a) CLIL module students show significantly higher levels of English anxiety when compared to CLIL stream students at t_0 .

II.b) There are no significant differences in English anxiety between CLIL module and CLIL stream students at t_3 .

III. Self-efficacy CLIL

With the CLIL module being a completely new experience in the students' subject matter classes, their self-efficacy beliefs about this challenge are presumably lower before they tested the concept for a few lessons. Due to supportive and scaffolding means, it can be expected that the students' will cope well with the CLIL modules, which is why the hypothesis for the follow-up investigation does no longer assume a difference between the module and stream students.

III.a) CLIL module students show significantly lower levels of self-efficacy when compared to CLIL stream students at t_0 .

III.b) There are no significant differences in self-efficacy between CLIL module and CLIL stream students at t_3 .

5. Results and discussion

Based on students' school marks, the stream group performed significantly better in English ($t(198.875) = 7.150$, $p \leq 0.001$, $d = 0.95$) and biology ($t(173.811) = 3.502$, $p = 0.001$, $d = 0.46$) than their peers in the module group (see Tab. 2). Better English grades may be explained by the strict selection process, but also that these students had additional preparatory lessons in year 5 and 6 and that their regular CLIL lessons are predominantly held in English. Additionally, they are used to the CLIL teaching style in various subjects for the past three years. However, all students have taken regular English as a foreign language classes for at least five consecutive years, suggesting a level of B1 in the European framework of reference for languages (MSW NRW, 2014, p. 12).

Table 3. Scholastic performance differences in module and stream group students.

	Group	N	Mean	SD	T	df	Sig. (2-tailed)	Cohen's <i>d</i>
English mark	Modules	183	2.75	0.878	7.150	198.875	0.000	0.946
	Streams	83	2.04	0.689				
Biology mark	Modules	183	2.52	0.919	3.502	173.811	0.001	0.463
	Streams	83	2.12	0.832				

Please note: German grading system: from 1 = very good; to 6 = fail

Students in both groups differed in subject preference (see Fig. 2), with the majority of students in the stream group preferred English (55%), whereas those participating in modules preferred biology (42.9%). Subject preference was significantly positively correlated with *affinity*, making this variable a valid means of analysis (Ohlberger & Wegner, 2017, p.159).

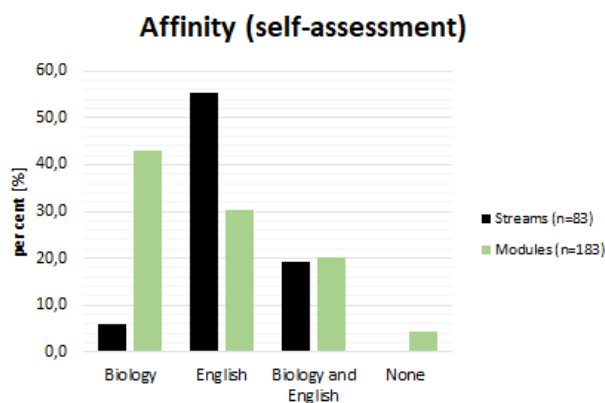


Figure 2. Subject preferences of students in the stream and module groups.

Compared to students in CLIL streams, module students showed significantly lower levels of the construct English affinity before the modules started ($t(203.392) = 7.03$, $p \leq 0.001$, $d = 0.95$; see Fig. 3 and Tab. 4, accepts hypothesis I.a). This may also be explained by the selection process as stream students were aware of the CLIL programme requirements beforehand and had the choice to take part in the programme. Furthermore, this coincides with the result that the stream students performed significantly better in English, leading us to confirm that motivation and performance heavily influence each other (Schiefele, 2009, p. 164f.).

As self-efficacy greatly impacts learning and performance behaviour (Feng, Wang & Rost, 2018, p.24; Donat, Radant & Dalbert, 2008, p. 182), we also observed that the stream group had significantly higher self-efficacy levels ($t(247) = 3.05$, $p \leq 0.001$, $d = 0.50$; see Fig. 3 and Tab. 4, accepts hypothesis III.a), once again validating the effects of the selection process (Küppers & Trautmann, 2013; Rumlich, 2016; Möller, Hohenstein, Fleckenstein & Baumert, 2017).

CLIL module students show significantly less extrinsic motivation for the English language before and after the intervention ($t(212.537) = 6.67$, $p \leq 0.001$, $d = 0.90$ at t_0 ; $t(216.51) = 5.12$, $p \leq 0.001$, $d = 0.70$ at t_3 , respectively, see Fig. 3 and Tab. 4, accepts hypothesis I.d). This is unfortunate as it may imply that the use of the modules did not encourage module students to see the importance of using English in their everyday lives. This is in contrast to students in the stream group, where extrinsic motives are common, either because they chose this programme or realised the importance after being in the programme.

After the intervention, stream students still exhibit higher values in English affinity when compared to module students ($t(232) = 7.96$, $p \leq 0.001$, $d = 1.09$, see Fig. 3 and Tab. 4), which also links with the levels of disinterest in English at t_0 , which – as expected – are significantly higher in CLIL module students ($t(241.914) = 2.79$, $p = 0.006$, $d = 0.38$, accepts hypothesis I.c, rejects hypothesis I.e). Even after participating in two CLIL modules, there is still an increase in disinterest in English for module students ($t(8223.748) = 6.86$, $p \leq 0.001$, $d = 0.94$, rejects hypothesis I.g), suggesting that teaching subject-specific matter in a foreign language did not lead to a positive attitude towards English, as various other studies propose (e.g. Darn, 2006).

No significant differences were observed in biology affinity between groups (see Tab. 4, accepts hypotheses I.b and I.f). However, CLIL module students have a higher affinity in comparison to stream students before the intervention, but this trend swaps after the intervention. This could be explained by the circumstance that students apply for CLIL streams based on the language but not the subject content. While CLIL stream students clearly prefer the language based on their comparatively high affinity scores, this could not be proven for the CLIL module students; after having taken part in two modules, the affinity for English as a subject even decreased, thus this kind of intervention did not seem to help raise their attitude towards the foreign language. This may also be partly due to a disinterest in the topic or that they did not handle the change of teacher well.

CLIL module students exhibit significantly higher levels of language anxiety before the modules when compared to students who willingly chose CLIL streams ($t(232.986) = 8.00, p \leq 0.001, d = 1.08$; Pihko, 2007, p. 134; Thompson & Sylvén, 2015, p. 14, accepts hypothesis II.a). Module students experienced a decrease in anxiety levels, which is still significantly higher compared to CLIL stream students ($t(228.045) = 6.75, p \leq 0.001, d = 0.92$, rejects hypothesis II.b). These findings correspond to our results on lower motivation for English and results from other studies (Alrabai, 2015). Although anxiety levels in the CLIL stream group are relatively low, it is still widely accepted that anxiety is also a problem for successful language students (Pihko, 2007, p. 139).

Students from CLIL streams have significantly higher levels of self-efficacy than those participating in CLIL modules ($t(247) = 3.05, p \leq 0.001, d = 0.50$ at t_0 ; $t(196.814) = 2.72, p = 0.007, d = 0.37$ at t_3 , accepts hypothesis III.a, rejects hypothesis III.b), agreeing with a previous study (Jaekel, 2018, p. 16f.). A central finding of this study is that CLIL module students experienced slightly increased self-efficacy (see Tab. 4).

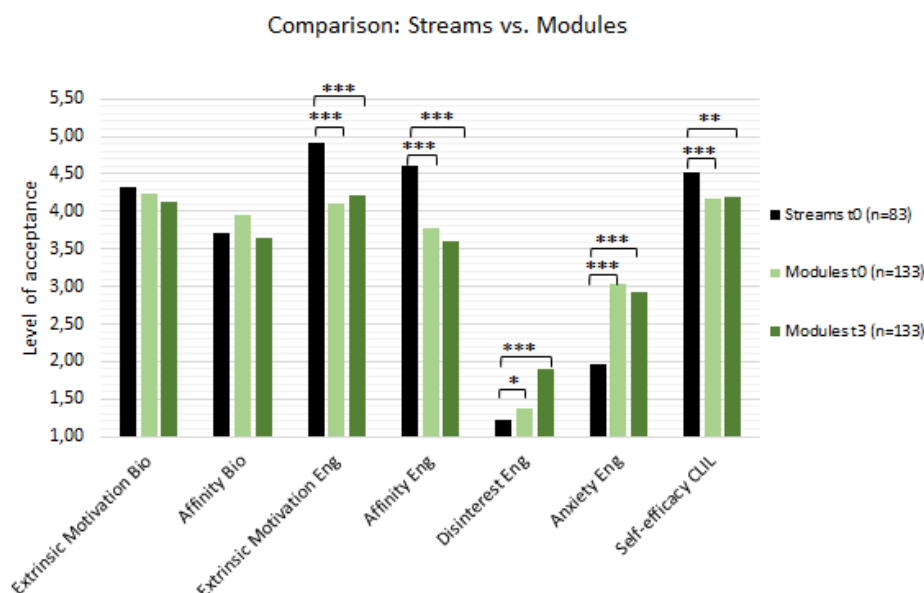


Figure 3. Comparison of all construct means between CLIL stream and module students. As a comparable value of CLIL stream students, t_0 is taken into account. Note: significant results are only indicated for group differences.

* ≤ 0.050 , ** ≤ 0.010 , *** ≤ 0.001

Table 4. Construct means for the CLIL stream group at t_0 and the CLIL module group at both t_0 and t_3 . If group comparison results are significantly different, this is indicated by supplying p and Cohen's d .

	Construct	Stream group t_0	Module group t_0	Module group t_3	Group difference t_0	Group difference t_3
					p , Cohen's d	p , Cohen's d
Biology	Extrinsic Motivation	4.32	4.26	4.16	-	-
	Affinity	3.72	3.94	3.58	-	-
English	Extrinsic Motivation	4.92	4.05	4.22	*** (0.000) $d = 0.90$	*** (0.000) $d = 0.70$
	Affinity	4.60	3.75	3.64	*** (0.000) $d = 0.95$	*** (0.000) $d = 1.09$
	Disinterest	1.22	1.43	1.85	** (0.006) $d = 0.38$	*** (0.000) $d = 0.94$
	Anxiety	1.96	3.01	2.88	*** (0.000) $d = 1.08$	*** (0.000) $d = 0.92$
CLIL	Self-efficacy	4.53	4.13	4.22	*** (0.000) $d = 0.50$	** (0.007) $d = 0.37$

* ≤ 0.050 , ** ≤ 0.010 , *** ≤ 0.001

Taking the aspects of self-efficacy, academic performance, motivation and anxiety into consideration, a distinct picture emerges: Students in CLIL streams with roughly three years of experience in CLIL lessons are high-achievers in both English and biology, show high motivational levels for English with good marks, are highly self-efficacious and, by implication, less anxious when compared to non-CLIL peers. The module group has poorer marks in English and biology, shows less motivation for English but is slightly more motivated for biology in contrast to the CLIL group. Also, the CLIL module students are less self-efficacious and more anxious. To address students' (language) uncertainties, CLIL teachers require proper linguistic and pedagogical abilities to offer support (Pihko, 2007, p. 139).

Since CLIL stream group students are high-performers because of the selection process, it could be possible to mitigate the creaming effect by taking a subgroup with similar characteristics from the group of regular students. This was examined by categorising students from the module group into further subgroups comparable to the selection process such as students that (1) perform well in English (2) have a self-assessed preference for English and (3) have a self-assessed preference for English and biology.

When comparing subgroup (1) ($n = 11$) with the CLIL stream group, there are significant differences in extrinsic English motivation at t_0 ($p = 0.015$, $d = 0.52$, see Fig. 4) and English affinity at t_3 ($p = 0.047$, $d = 0.42$; see Fig. 4). Presumably due to the higher amount of exposure to the foreign language, the stream students' English affinity has risen throughout partaking in the CLIL programme over the years, while the module group could not yet profit from that circumstance. They might need more time to get used to the new teaching concept and develop a positive attitude. However, negative developments on parts of the module group from t_0 to t_3 contradict this assumption; the affinity for biology ($p = 0.008$, $d = 2.71$) and for English are affected and it can only be speculated that more routine and thus more CLIL modules would eventually revert the trend. The same applies to the growing disinterest for English and language anxiety. However, there is an increase in extrinsic English motivation after the intervention.

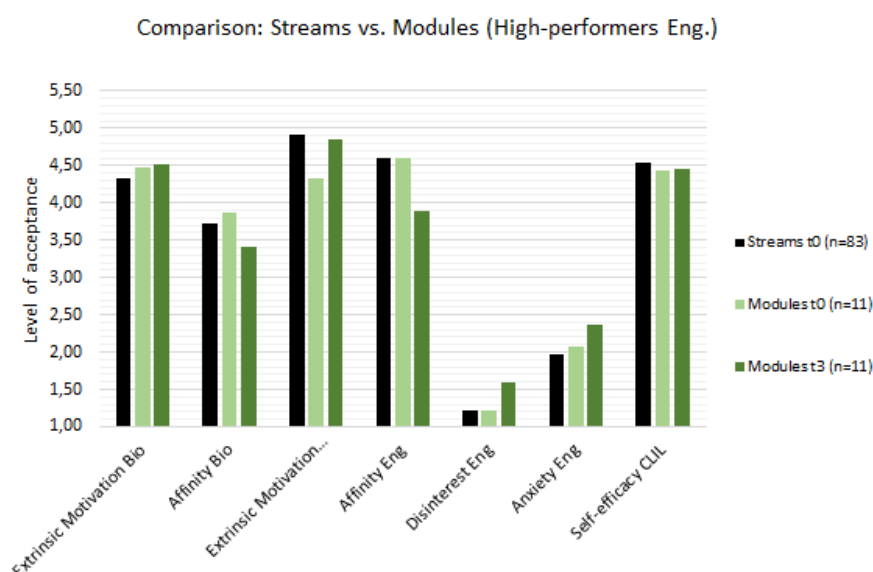


Figure 4. Comparison of all construct means between CLIL stream students and CLIL module students who are high-performers in English. As a comparable value of CLIL stream students, only t_0 is taken into account. Note: significant results are only indicated for group differences. * ≤ 0.050 , ** ≤ 0.010 , *** ≤ 0.001

Students who have a preference for English (subgroup (2), $n = 38$) are likely to participate in regular CLIL programmes. In comparison to the stream group, significant differences arise in biology and English affinity at t_3 ($p = 0.032$, $d = 0.40$, $p = 0.005$, $d = 0.52$ respectively) and extrinsic English motivation at t_0 ($p = 0.009$, $d = 0.49$, see Fig. 5). Further, students differ significantly in perceived self-efficacy at both points in time ($p = 0.020$, $d = 0.43$ for t_0 and $p = 0.007$, $d = 0.51$ for t_3). In subgroup (2), disinterest for English is lower

when contrasted with stream students, however, this increases throughout the intervention, accounting for a significant difference between t_0 and t_3 ($p = 0.002$, $d = 1.18$).

It has been argued that using a foreign language to teach another subject could have compensation effects to encourage students to appreciate another subject (Bonnet, 2012, p. 208). This does not seem to hold true for subgroup (2). Instead of compensating for the other subject, students might rather have felt that there was not enough focus on the language and that they did not progress as fast as expected. Additionally, their self-efficacy could have decreased once they realised that the language was possibly more complicated in a scientific context.

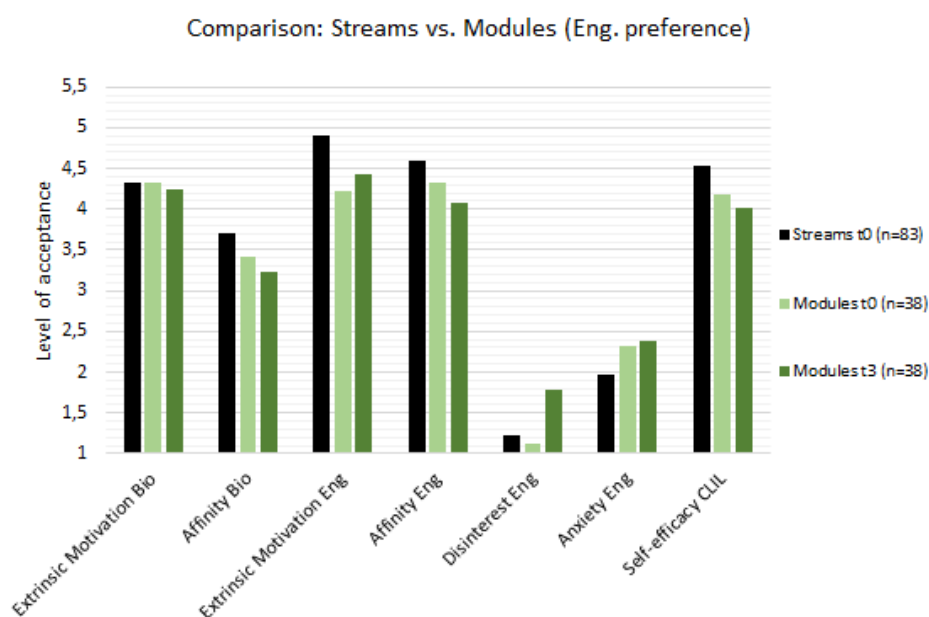


Figure 5. Comparison of all construct means between CLIL stream students and CLIL module students who are rather English-prone. As a comparable value of CLIL stream students, solely t_0 is taken into account. Note: significant results are only indicated for group differences. * ≤ 0.050 , ** ≤ 0.010 , *** ≤ 0.001

Ideally students interested in CLIL programmes have an affinity both to the language and to the CLIL subject, which led us to take a deeper look at students with a preference for English and biology (subgroup (3), $n = 28$, see Fig. 6). Both the regular CLIL stream students as well as the module students with an English and biology subject preference show considerable differences in extrinsic English motivation ($p = 0.001$, $d = 0.63$ at t_0), English affinity ($p = 0.005$, $d = 0.56$ at t_0 and $p \leq 0.001$, $d = 0.83$ at t_3), English disinterest at t_3 ($p \leq 0.001$, $d = 0.73$) and anxiety ($p \leq 0.001$, $d = 0.73$ at t_0 and $p = 0.00$, $d = 0.54$ at t_3). The subgroup of module students with an English and biology subject preference experienced similar changes from t_0 to t_3 as witnessed in the other subgroups (high-performers in English; English subject preference); affinities for both subjects decrease (significantly in biology: $p = 0.012$, $d = 1.08$) and disinterest for English significantly increases ($p = 0.001$, $d = 1.59$). On the other hand, English anxiety is significantly lowered through the intervention ($p = 0.045$, $d = 0.82$), which is considered a small success as there is also a slight increase in extrinsic English motivation.

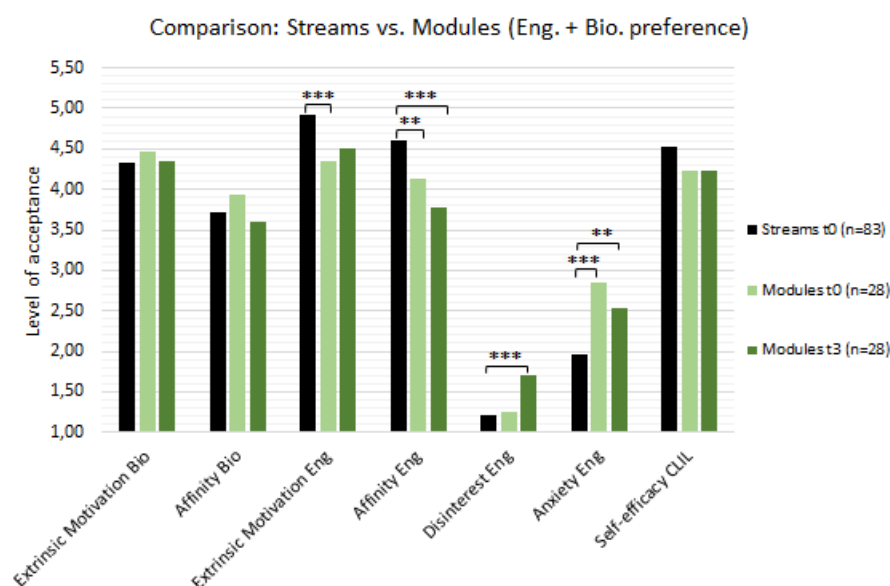


Figure 6. Comparison of all construct means between CLIL stream students and CLIL module students who favour English and biology equally. As a comparable value of CLIL stream students, only t_0 is taken into account. Note: significant results are only indicated for group differences. * ≤ 0.050 , ** ≤ 0.010 , *** ≤ 0.001

For a concluding overview of the hypotheses discussed, table 5 provides information on the results.

Table 5. Overview of hypotheses and their evaluation as indicated by proven (✓) or rejected (*).

I. Motivation/interest		evaluation
I.a	CLIL module students show significantly lower levels of English affinity (mean of intrinsic motivation and interest) when compared to CLIL stream students at t_0 .	✓
I.b	There is no significant difference in Biology affinity (mean of intrinsic motivation and interest) between CLIL module and CLIL stream students at t_0 .	✓
I.c	CLIL module students show significantly higher levels of disinterest for English when compared to CLIL stream students at t_0 .	✓
I.d	CLIL module students show significantly lower levels of extrinsic motivation for English when compared to CLIL stream students at t_0 .	✓
I.e	There is no significant difference in English affinity (mean of intrinsic motivation and interest) between CLIL module and CLIL stream students at t_3 .	✗

I.f There is no significant difference in Biology affinity (mean of intrinsic motivation and interest) between CLIL module and CLIL stream students at t_3 . ✓

I.g There is no significant difference in disinterest for English between CLIL module and CLIL stream students at t_3 . ✗

II. Anxiety

II.a CLIL module students show significantly higher levels of English anxiety when compared to CLIL stream students at t_0 . ✓

II.b There is no significant difference in English anxiety between CLIL module and CLIL stream students at t_3 . ✗

III. Self-efficacy CLIL

III.a CLIL module students show significantly lower levels of self-efficacy when compared to CLIL stream students at t_0 . ✓

III.b There is no significant difference in self-efficacy between CLIL module and CLIL stream students at t_3 . ✗

6. Conclusion and outlook

Our results suggest that all values for English constructs were higher in the CLIL stream group, indicating a positive orientation for students in properly established CLIL programmes (Pihko, 2007, p. 138). The creaming effect can further be seen by looking at perceived self-efficacy scores and school marks. Although some CLIL module subgroups resemble the CLIL stream group, the generalisation that the three-year CLIL stream group will have different attitudes towards English still holds. This study has, therefore, not provided full-scale support for the assumption that CLIL modules might provide an effective and more inclusive alternative to CLIL streams, confirming Mehisto's statement that "CLIL is so complex a task that it can malfunction" (2008, p. 108).

It has to be kept in mind that CLIL modules are highly dependent on the practical realisation which varies according to the teacher's expertise and the emphasis he or she wants to set, even more so than in CLIL streams as guidelines for modules barely exist. As this study only focused on 10th grade students, future studies should examine students from another age group, or use modules with different topics or a different subject entirely. The only robust evidence could be supplied by longitudinal studies contrasting CLIL stream students with CLIL module students who experience the modules repeatedly over the same period of time, while a serious limitation of the present study is its focus on only two modules within six months. As this intervention could not be expected to

yield measurable changes, continuous effort has to be made to investigate correlations between CLIL types and motivational factors further.

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