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Research Article

SENSE OF COMPETENCE AND COMMITMENT OF LEARNERS IN THE C SERIES IN A SITUATION OF FAILURE IN MATHEMATICS

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Abstract

This article studies the relationship between the sense of competence of students in the C series and their level of engagement in mathematics in Cameroon. The feeling of competence is assimilated to people's beliefs concerning their competence to accomplish a task successfully. This feeling involves self-confidence, attributional beliefs and emotional experience. Necessary for autonomy during learning, these dimensions unfold before, during and after the cognitive activity related to mathematics. Ninety-four (94) students in the C series at Manjogovernment high school formed the study sample. A self-administered questionnaire and the Behavioral-Emotional-Cognitive School Engagement Scale (BEC-SES) were used during data collection. The results of the survey show that Series C learners need to give meaning to mathematics learning through self-confidence. Seeing themselves as actors in their own learning, their commitment to mathematics depends on their internal locus; and as the intensity of their emotions towards mathematics increases, their level of commitment decreases.

Keywords: Feeling of competence, Commitment, Mathematics, Series C, Failure situation.

INTRODUCTION

Effective functioning requires both skills and efficacy beliefs in order to use them well (Bandura, 2003). This is why different individuals with identical skills, or the same individual in different circumstances, can therefore achieve poor, good or outstanding performance, depending on variations in their self-efficacy beliefs (Noumbi Nouwou & Fasse Mbouya, 2023). The initial level of skills does influence performance, but its impact is strongly mediated by self-efficacy beliefs. From this perspective, Bandura (2003) distinguishes between two categories of people: those with a weak or strong sense of efficacy. People with a strong belief in their potential approach difficult tasks as challenges to be met rather than threats to be avoided, which increases their interest in them. They set themselves stimulating goals and maintain a strong commitment to them, investing a great deal of effort and increasing it in the event of failure or setbacks. They remain focused on the task in hand and think strategically in the face of difficulties. They attribute failure to insufficient effort, which encourages an orientation towards success, and they quickly recover their sense of effectiveness after a failure or a drop in performance. Finally, they approach potential threats or stressors with confidence that they can exercise some control over them. On the other hand, the abilities of people with a low sense of efficacy can be easily limited or even cancelled out by doubts about their ability to succeed (Bandura, 2003). These people avoid difficult tasks in areas where they doubt their abilities. They find it hard to motivate themselves and either reduce their efforts or give up quickly when faced with obstacles. They have low aspirations and little commitment to the goals they decide to pursue. In trying situations, they dwell on their inadequacies, on the difficulties of the task in hand and on the problematic consequences of failure (Bandura, 2003). These disruptive thoughts then ruin their efforts and their analytical thinking by distracting their attention from the best way of performing the activities and directing it towards their personal inadequacies. All it takes is a few failures for them to lose faith in their abilities, as would be the case with so-called scientific learners who repeatedly fail mathematics. Although mathematics is regarded as a key subject for success in many areas of life, it is perceived as one of the most difficult subjects in secondary education. A pre-survey of teachers of this subject revealed that the majority of learners have major difficulties due to gaps accumulated in the lower levels. According to the majority of these teachers, mathematics seems to be the “bête noire” of the pupils, even though many of them choose the scientific series when they leave 3ème. For example, at Manjogovernment high school in the Moungo department of Cameroon's Littoral region, the performance of students in the “C” series in mathematics is alarming. The results for the first term of the 2023-2024 academic year show that out of 80 students in seconde “C”, the overall class average in mathematics is 7.36/20, with a pass rate of 11.25%. In 1ère C, no student out of 23 obtained a mark equal to or higher than 10/20, giving a pass rate of 00% and an average of 5.4/20. Furthermore, in Terminale (Tle) C, only 7 out of 23 pupils obtained a mark of 10/20 or higher, giving a pass rate of 30.43% (Source: Lycée de Manjo IT Unit). In the 2nd C class, out of 75 pupils who took part in the assessments, only 5 obtained a mark equal to or higher than 10/20, giving a pass rate of 6.75% with a class average of 5.75/20. In 1ère C, out of 20 students assessed, only 3 obtained a mark of 10/20 or higher, giving a pass rate of 15% with an average of 5.75/20. Out of 24 students assessed in Tle C, 10 obtained a mark of 10 or higher, giving a pass rate of 41.6% and an average of 9.5/20 (Source: Government High School of Manjo IT Unit). Faced with this situation, we asked ourselves: what could be at the root of this situation?

A number of studies have reported numerous failures and drop-outs in mathematics. Tobias (1979) refers to difficult and negative past experiences that influence the way students approach mathematics. In this vein, some people are convinced

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that they cannot succeed in this discipline, while others wish to avoid any situation where they might have to solve problems with a mathematical content. These experiences can lead to an aversion to the subject (Martinez and Martinez, 1996). In addition, Lafortune and Mongeau (2002) place specific emphasis on affective aspects such as anxiety in the teaching of mathematics. For these authors, there is a focus on the content of the syllabus, which prevents teachers from devoting time to students' attitudes. Activities relating to the affective and therefore emotional dimension are often perceived as a waste of time that prevents them from covering the whole subject. As the cognitive dimension becomes paramount, pupils feel helpless when they experience discomfort in a problem-solving situation and end up wanting to avoid contexts with a mathematical content. Moreover, this reductionist conception of mathematics, according to Lafortune and Mongeau (2002), persists at all levels of schooling. As a result, these authors maintain that at primary level, arithmetic generally takes up too much space, to the detriment of geometry. This leads pupils to think that "real mathematics" is more about calculations and that "geometry is not mathematics" (Lafortune & St Pierre, 1994). This being the case, some pupils who do well in mathematics are not valued for their success in geometry and come to think that they are not effective or efficient in mathematics even if they only have difficulties in arithmetic. Yet geometry and arithmetic are both necessary in many problem-solving situations. Many teachers also have negative attitudes towards mathematics. Many are reluctant to move away from subject content because they do not always feel comfortable with the subject. Their knowledge and culture of mathematics is too often limited. This situation leads them to present mathematics in its algorithmic, technical and procedural dimensions, which does not encourage students to develop their intuition and creativity in mathematics and greatly limits the exercise of their critical thinking. Students who do not feel comfortable with this model may lose interest in mathematics, even though they sometimes have very relevant intuitions. Their mathematical creativity may fade and be replaced by negative reactions.

These negative attitudes towards mathematics are sometimes compounded by a certain reluctance on the part of teachers to use reflective or innovative approaches (Daniel, Lafortune, Pallascio and Sykes, 1996a). As a result, learners come to think that "doing mathematics" means memorising procedures, applying them and finding answers. In this vein, students who use different means from those taught may be penalised and consequently conclude that they do not have what we call "mathematical minds". However, their ways of doing things may be linked to mathematically relevant or heuristic approaches. Hence the need to look at how learners with learning difficulties perceive their academic skills. In this respect, a student who repeatedly fails during the first years of school comes to believe that he does not have the necessary skills to continue his studies. This leads to a decline in their perseverance in the face of adversity and, consequently, a weakening of their optimism (Goleman, 2014). Bandura (2003), in line with this view, maintains that individuals will have little reason to act or persevere in the face of difficulties if they are not convinced that they can obtain the results they want through their own action. It is therefore a question of analysing learners' difficulties in both acquiring and reproducing knowledge by considering their sense of competence. According to Bandura (1986), the feeling of competence refers to the judgements that individuals make about their ability to organise and carry out the series of actions required to achieve specific types of performance. In other words, it is the judgement that a person makes about his or her ability to perform a task in order to achieve a desired result. Thus, our more exploratory objective will be to verify the influence of the feeling of competence on the engagement of "C" series learners in mathematics. In other words, we want to examine the influence of their confidence in learning mathematics, their attributional beliefs and their emotional experience on their level of engagement in mathematics.

This study of Series 'C' learners' sense of competence is important because perceived competence appears to play a key role in the emergence of interest (Cosnefroy, 2007). According to Bandura (2003), the feeling of competence is based on previous experience, perceived social support, social comparison and the subject's verbal persuasion. It also depends on individuals' subjective explanations for the consequences of their actions. Either they attribute responsibility for their actions to external sources, or they make themselves responsible for them and therefore improve or avoid getting involved in the future (Wiener, 1986). Since emotions play a crucial role in rational decision-making (Damasio, 1994), the emergence of a feeling of competence may also stem from how learners feel about their successes or failures.

METHODOLOGY

Participants

The parent population for this study was all students in the second cycle of the C series in Cameroon. The accessible population consisted of 106 (one hundred and six) pupils at Manjo secondary school. From this population, 94 (ninety-four) students were selected by stratified random sampling to form the sample for this study. This heterogeneous sample is made up of 56 pupils from 2nd C, 18 pupils from 1st C and 20 pupils from Tle C. 86 participants are non-repeaters and 8 repeaters. There were 52 males and 42 females. On the other hand, we selected 12 (twelve) respondents for semi-structured interviews, 5 of whom were in 2nd year C, 6 in Tle C and 1 in 1ère C. These respondents were 10 men and 2 women.

Description of the materials and survey procedure

The diverse data collection tools we have used are adapted to the behaviours observed. Because of the implicit and subjective aspects of the variables manipulated, the tools relate to self-assessment. This being the case, the sources of information are the Behavioral-Emotional-Cognitive School Engagement Scale (BEC-SES) and the questionnaire. The self-administered questionnaire assesses pupils' sense of competence on the basis of three components corresponding to sub-scales: self-confidence, attributional beliefs and pupils' emotional experience. It begins with an identification section and includes a second section made up of 29 items based on four levels of the Likert scale. A score of 1 indicates an absence of a feeling of competence and a score of 4 indicates the highest feeling of competence. The tool shows good internal consistency at the level of the subscales, i.e. 0.6, 0.61 and 0.7 respectively. These values reflect acceptable internal consistency of the items in each dimension (Laurencelle, 1998). Factor analysis based on this study indicates an overall cronbach's alpha of 0.613. For the engagement assessment tool, the translated version of the Behavioral-Emotional-

Cognitive School Engagement Scale (BEC-SES) designed by Yibing Li (2022) was used. This scale consists of three subscales: behavioural school engagement, emotional school engagement and cognitive school engagement, each comprising 5 items for a total of 15 items assessed on a likert scale ranging from 0 (for total disagreement) to 3 (for total agreement). The survey was conducted using the self-assessment tools mentioned above. These were completed by students in the C series in order to assess their sense of competence and level of engagement in mathematics. The survey was carried out in classrooms at Manjogovernment high school, and Spearman's correlation was used to test the hypotheses set out in this study.

RESULTS AND DISCUSSION

The feeling of competence and the commitment of students in mathematics were explored using several tools, in particular a self-assessment questionnaire and a standardisedscale measuring the level of commitment addressed to students in the 2nd, 1st and Tle C classes at Manjo secondary school. The descriptive statistics show that, in general, the learners in the study had an average feeling of competence, as did their level of commitment. In addition, observation of the results obtained on the likert scale of 1 to 4 modalities ranging from 'totally disagree' to 'totally agree', the mean frequency of responses was 2.51 for confidence in learning mathematics, with a standard deviation of 1.17. Attributional beliefs had a frequency of 2.94 with a standard deviation of 1.17. The results obtained on the likert scale of 1 to 4 modalities ranging from 'totally disagree' to 'totally agree', the mean frequency of responses was 2.51 for confidence in learning mathematics with a standard deviation of 1.17. Attributional beliefs had a frequency of 2.94 with a standard deviation of 1.16, while emotional experience had a frequency of 2.81 with a standard deviation of 1.18.

The level of commitment also shows an average frequency of 2.17 with a standard deviation of 1.09 on the likert scale of 0 to 3 modalities ranging from 'never' to 'always'. This seems to reflect a level of optimism and an ability to feel one's place in the mathematics class that is still insufficient. The non-parametric hypothesis test, i.e. Spearman's correlation, consisted of measuring the link between the variables in play in this article. The null hypothesis is accepted or rejected on the basis of the results obtained.

- **As regards the relationship between confidence in learning mathematics and the mathematical commitment of series C students, we obtained the following results:**

Table 1. Symmetrical measurements between confidence in learning mathematics and the mathematical commitment

		Value	Asymptotic standard error[a]	Approximate T[b]	Approximate significance
Interval by Interval	Pearson's R	,126	,103	1,221	,025[c]
Ordinal by Ordinal	Spearman correlation	,134	,107	1,295	,019[c]
Number of valid observations		94			
a. The null hypothesis is not considered.					
b. Use of the asymptotic standard error in the null hypothesis.					
c. Based on normal approximation.					

It can be seen from this table that the value of the index for calculating the Spearman correlation between the variables in this hypothesis is 0.134 at a significance level of 0.01. This indicates a weakly significant correlation and indicates the existence of a link between confidence in learning mathematics and the level of engagement of the pupils in the C series. This indicates a weakly significant correlation and reflects the existence of a link between confidence in one's learning in mathematics and the level of commitment of the students in the C series. As we predicted, the engagement of series C students in mathematics is optimised when their level of confidence increases. These results are in line with those of Lussier and Patrick (2016) who indicate that students who feel more secure at school are perceived by their teachers as more engaged in class compared to those who are less confident. In the light of these results, we can argue that confidence during learning influences students' level of engagement. As Lafortune (1995) points out, a student who lacks confidence in his ability to succeed in mathematics usually reacts by giving up, learning by memorising, solving by automatism and by generalising failure. Convinced that they cannot solve a problem, they quickly give up looking for a solution, which implies a lack of commitment.

- **We obtained the following results on the relationship between attributional beliefs and the mathematical engagement of students in the C series:**

Table 2. Symmetrical measurements between attributional beliefs and the mathematical engagement

		Value	Asymptotic standard error[a]	Approximate T[b]	Approximate significance
Interval by Interval	Pearson's R	-,098	,087	-,943	,048[c]
Ordinal by Ordinal	Spearman correlation	-,110	,100	-1,059	,023[c]
Number of valid observations		94			
a. The null hypothesis is not considered.					
b. Use of the asymptotic standard error in the null hypothesis.					
c. Based on normal approximation.					

The observation of the value of the Spearman correlation coefficient index between the variables is -0.11 with a significance level of 0.02. This indicates an inverse and highly significant correlation between our study variables. This indicates an inverse and highly significant correlation between our study variables. Thus, students' level of engagement increases when attributional beliefs decrease. According to causal attribution theory, failure and success attributed to external factors may or may not lead the subject to action. According to Phillips (1996), schools frequently favour the 'success theory'. Learners with mathematical difficulties are inclined to believe that their successes are beyond their control, that they have no power over them and can do nothing to change them (Lafortune and St-Pierre, 1994). In this vein, Blouin (1985, 1987) found that students who succeed in mathematics do not attribute their failures and successes to the same causes as those who have difficulty in the subject. For Blouin, the latter are more likely to believe that success is a matter of talent, over which they have no control (Lafortune, Mongeau, Daniel &Pallascio, 2002).

- **We obtained the following results on the relationship between the emotional experience and mathematical engagement of students in the C series:**

Table 3. Symmetrical measurements between emotional experience and mathematical engagement

		Value	Asymptotic standard error[a]	Approximate T[b]	Approximate significance
Interval by Interval	Pearson's R	-,147	,106	-1,424	,058[c]
Ordinal by Ordinal	Spearman correlation	-,121	,095	-1,168	,026[c]
Number of valid observations		94			
a. The null hypothesis is not considered.					
b. Use of the asymptotic standard error in the null hypothesis.					
c. Based on normal approximation.					

The table above shows a Spearman's rho index of -0.12 with a significance level of 0.02. This indicates a highly significant inverse correlation between our study variables and acceptance of the null hypothesis. This indicates a highly significant inverse correlation between our study variables and acceptance of the null hypothesis. This being the case, as the intensity of emotional experience increases, learners' level of engagement in mathematics decreases. This result is in line with a PISA survey (Programme for International Student Assessment, 2022) which reveals that in most countries, students who attend schools with lower performance obviously tend to report greater anxiety. In any case, this result could explain the near-general failure of Serie C learners in mathematics. As Favre (2010) argues, emotions provide learners with important information about their relationship with the subject being studied. For example, the fear of failing an exam will motivate students either to work harder to master the subject and reduce this negative affect, or to avoid the situation (Pekrun, Elliot & Maier, 2009). However, while positive emotions usually promote learning, while negative emotions hinder it, negative emotions can on the other hand have a positive "activating" effect on learning (D'Mello & Graesser, 2012).

Conclusion

One of the questions guiding this article was whether Series C students' sense of competence affected their engagement in mathematics. Unsuccessful Serie C learners at Manjo lycée took part in the survey. Although modest in relation to the size of the sample, this study shows that it is not only possible, but also necessary, to take account of pupils' beliefs in their abilities and their feelings. We can only agree with our results, which indicate that there is a monotonic positive relationship between self-confidence during learning and student engagement in mathematics. In addition, attributional beliefs and emotional experience are inversely related to engagement in mathematics for students in the C series. However, the fact remains that these three components indicating a feeling of competence form a 'whole' because cognitive, affective and conative are interdependent (Nkelzok, 2009). This being the case, Philips (1996) maintains that students will have a better self-image if they succeed, if their ideas are considered good, if they are approved by others and if they correspond to those of the majority. Moreover, to limit the decline in intellectual performance, it is essential to optimise commitment at school. This optimisation therefore requires emotional education to be integrated into the lessons already taught (Goleman, 2014), in order to improve the quality of the teaching-learning process. For this reason, Nadeau (2018) believes that emotional support combined with the pedagogical support offered by the teacher are linked to student engagement throughout the school year.

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