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Teaching with Chunking in Synchronous Classes: The Influence on University Students' Intrinsic Motivation

Edgar L. Martínez-Huamán*
José María Arguedas National University, Andahuaylas, Perú

Carmen Quiza Añazco
José María Arguedas National University, Andahuaylas, Perú

Sergio Cuellar Quispe
José María Arguedas National University, Andahuaylas, Perú

Blanca N. Gutiérrez-Pérez
Ciro Alegría National University, La Libertad, Perú

Abstract. Virtual education has allowed for the formation of new forms of teaching during the synchronous classes, thereby replacing traditional expository teaching. The aim of this study was to analyse the influence of chunking synchronous classes on the intrinsic motivation of university students enrolled in different academic programs in a public university in Peru. A total of 114 students and three professors participated in the study. The classes were systematised to consider the beginning, development, and closing of the educational process. In the stages of chunking, strategies for the recovery and consolidation of learning were used through the implementation of technological tools. This study focuses on the methodology of participant-active research under the systematisation of experiences. Three categories emerged in the results: active participation in interactive spaces, active listening in virtual spaces, and the use of technological tools allowing for the managing of a new way of directing the online teaching-learning process through teaching via chunking. The opportunities for students to interact were thereby increased, avoiding dissatisfaction, fatigue, and distractions, as well as the incorporation of activities that served to motivate, provide feedback, consolidate, and reinforce the capacities of attention, concentration, and the assimilation of the lesson content. This study concludes that teaching through chunking in synchronous classes that influence the intrinsic motivation of university students, as well as consolidating their learning and improving teachers' pedagogical practices.

* Corresponding author: *Edgar Luis Martínez Huamán, emart---inez@unajma.edu.pe*

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1. Introduction

In the current circumstances that the educational system is going through in post-pandemic times, this allows for further studies into successful pedagogical practices to determine what should continue. The COVID-19 pandemic had catastrophic effects, not only on health, but also on peoples' psychology (Akat & Karata, 2020). These psychological effects have also impacted education, affecting both students and teachers during synchronous and asynchronous classes.

Didactic teaching-learning strategies were modified for college education during the pandemic that was caused by the SARS COV-2 virus. Concurrently, technological tools and resources were more frequently used. In this new scenario of teaching and learning, the spaces for academic experiences between the subjects and the elements of education underwent significant changes that had an impact on the development of new forms of teaching. However, there are still questions about the planning of teaching, the effectiveness of the methods used, as well as the forms of evaluation that arise during a health emergency (Muthuprasad et al., 2021; Kurmanova et al., 2022).

Didactics, as a discipline from the field of education, can be found among the different elements of education and learning. Its subject of study is the teaching-learning process; and its design and application create experiences that provide answers to the needs found in learning by considering the advantages that educational technology offers. The teaching approach (didactic) encompasses content, learning activities, the usage of technological tools, and the evaluation strategies that, together, allow the teacher's performance to be transformed (Biggs & Tang, 2011).

In this sense, the college professors' daily teachings are a unique experience between the teachers, the students, and the topic at hand. Through the teaching approach (didactic), students can develop their competencies, regardless of the course or environment that they are in (Iglesias-Pradas et alt., 2021; Bedair et al., 2022). Thus, the new environment is the virtual classroom, which is a space that allows for a teacher-student connection and that facilitates the teaching-learning process through the use of technological resources whereby the students can develop autonomous, meaningful, and functional learning. It also develops digital skills in both the teachers and the students, generating a culture primed for the use of ICT (Williamson et al., 2020).

Consequently, virtual classrooms turn into online learning environments mediated by technology in which active, flexible, and innovative methodologies are used for teaching. For this reason, virtual education is a transformative educational experience in a new context where the subjects and fundamental elements of any teaching endeavor intervene (Abudalfa & Salem, 2023). Another aspect to consider is that virtual classrooms allow both synchronous and

asynchronous teacher-student interactions when reviewing the lesson content. Synchronous classes are educational spaces for real-time online connections; they allow for the sharing of activities between students and teachers; and they constitute a joint and interrelated teaching-learning academic experience. In this virtual-synchronous space, the teacher can assess the students' learning progress and provide feedback, based on the challenges that the student encounters (Wu & You, 2022; Moallem, 2015).

Synchronous classes, like in-person classes, have their own processes and stages. Each stage requires planning that focuses on designing lesson plans that are based on the students' needs; and it must not be left as a last-minute thing to do; or just to be improvised by the teacher (Fernandez et al., 2022). For a successful session, certain elements, such as the recommended structure, must be considered: introduction, development, closing, necessary logistical resources (presentations and the teaching-learning materials that will be used before, during, and after the session), as well as the guidelines and content for the session (informative data, learning outcomes, didactic sequence, and evaluations).

Following this framework, most of the time, synchronous classes are still like traditional classes – due to the lack of digital abilities and knowledge on how to create and apply strategies for a more dynamic lesson (Hrastinski, 2008). Traditional lessons are characterised by lectures in which the teacher provides a presentation for almost the whole lesson, uses digital resources for theoretical explanations, and rarely conducts activities in which the students can participate (Lawless, 2022; Perveen, 2016).

Even considering this precedent and the notion that we are now in the digital era of education, there are still traditional instructional practices rooted in the paradigm of knowledge, transference through master classes, conferences, and presentations. This only generates memorisation; and it prevents the development of critical, reflexive, co-operative, and interactive thinking among students (Cevikbas & Kaiser, 2020; Malamed, 2011). In a scenario like this, formative experiences in a digital setting require an environment of interest and motivation from the students for the acquisition of knowledge. This motivation is linked to the student's interest in learning and the willingness to know more and have significant experiences. Motivation is fundamental because it influences the way that the learners think, act, and feel, while sitting through a lesson or a course; it is also essential successful achievement of learning (Zhao et al., 2021; Bandura, 2010).

Nonetheless, the intrinsic motivation during social distancing, due to the health emergency, has had an impact on students' learning, evaluations, and the role of teachers. Students have experienced a period of crisis, in which they were not motivated; because the teacher's mediation (with the aid of technology) was monotonous, boring, and not very significant. The instruction of the content based on presentations and long texts was heavily favoured, thereby limiting the organisation and the flow of open, flexible, and complex ideas, based on positive

emotions that assist in the acquisition of learning (Khozaei et al., 2022; Xavier & Meneses, 2022; Feng et al., 2022).

In the light of the above, 'chunking' synchronous lessons in virtual environments are proposed, as a strategy to generate active and dynamic learning experiences using a variety of technological resources which facilitate the creation of new learning experiences for the students (Schell & Porter, 2018). Chunking is a strategy that is most commonly used in studying techniques. The act of chunking is a mental process that allows for the union of different pieces of information, based on meanings that are much more durable. A chunk is a logical unit that is easy to remember and incorporated into the higher-level concepts of the topic that is being taught/learnt (Schell & Butler, 2018). Instructional chunking helps the students to learn better; because it allows for higher levels of attention and concentration during the 10-to-15-minute lessons or blocks. In this period of time, the information is stored in the form of a short-term memory; and this memory space is small compared to long-term memory, which is larger and allows for the storing of infinite amounts of information.

Providing a student with a great deal of information in a short period of time with no breaks, and not allowing space for the internalisation of the content is a frequent error in traditional education (Mazur, 1997). When a lesson is split into chunks, these chunks open up a gap in short-term memory that gives the students time to think about and consider what they are learning which enables much more significant learning through metacognition. In this sense, the knowledge that has been apprehended by the student will be more durable; as it is incorporated into the long-term memory, thereby allowing the student to learn more things in a better, more effective way, promoting significant learning experiences (Schell, 2020).

For Williamson and Schell (n.d), chunking consists of breaking up the uninterrupted theoretical content that a professor gives a student during a lesson on any given topic. This methodological proposal is related to the information the brain receives and how that information is processed. Pauses or breaks that take place. due to chunking, allow the information that is being received by the brain to have a better possibility of storage and permanence, in other words, significant learning. The efficacy of planning pauses and breaks to introduce new activities during a lesson has been verified in the research done by authors like Ruhl et al. (1990), in which the students were able to remember more concepts, vocabulary words, and ideas.

1.1 Aim of the Study

Considering this, the present research aimed to analyse the use of synchronous lecture chunking on the intrinsic motivation of university students during a health emergency.

2. Materials and Methods

2.1 Design and approach

The framework for this study was qualitative, concentrating on the interpretation processes and lived experience descriptions of a group of people (Ruhl & Suritsky,

1995; Creswell, 2012). The influence of chunking synchronous classes on the intrinsic motivation of college students was analysed, taking the course's program, its content, and didactic resources into consideration. Accordingly, the analysis of the students' learning experiences related to the process of chunking in synchronous classes was based on the systematic records of their experiences. Systematisation is considered to be a reflection of the instructional practices undertaken via the means of observation and the annotation of individual and collective activities, thereby allowing for the examination and comprehension of student learning and their interactions (Miles & Huberman, 1994). This process of systematisation is based on the reconstruction of occurred experiences in an orderly and progressive manner, and from a critical standpoint. This allows for the flow of new information on and from the experience (Strauss & Corbin, 1990). From the systematisation framework, instructional practices are oriented towards qualitative methodologies, specifically the participant-action method of investigation by using a longitudinal approach and an ethnographic research design (Jara, 2018).

2.2. The Participants

The participants of this study were three professors, who taught courses on writing and composition, academic writing, and college writing and public speaking whose ages ranged from 40 to 55 years, and who each had more than 10 years of experience as college-level professors. They were selected by using the purposive and convenience methods. Additionally, 114 students from different academic programs, such as agro-industrial engineering, intercultural primary education, and business administration enrolled in José María Arguedas National University during the 2021-1 and 2021-2 semesters, also participated. The selection criterion for the students was the following: they had to be regular recent students taking a course on writing and composition, academic writing, or university writing and speaking.

The students received informed consent letters for their participation in the study and their intervention was validated through their signed consent.

Table 1: Sample students enrolled on academic programs and courses

Academic Program	Course	Gender		Total
		M	F	
Agro-industrial Engineering	Writing and Composition	26	12	38
Intercultural Primary Education	Academic Writing	13	23	36
Business Administration	University Writing and Speaking	19	21	40

2.3 The Data-Gathering Process

Participant-action research integrates collaborative and participative characteristics with the goal of strengthening, by using different strategies, the acquisition of knowledge through dynamic classes.

Taking this into account, the didactic sequence for synchronous classes, in addition to the use of chunking, was constructed in a sequential and schematic

manner considering the moments of the learning session (beginning, development and closing), as well as the didactic strategies used in each moment. This procedure is shown in Figure 1.

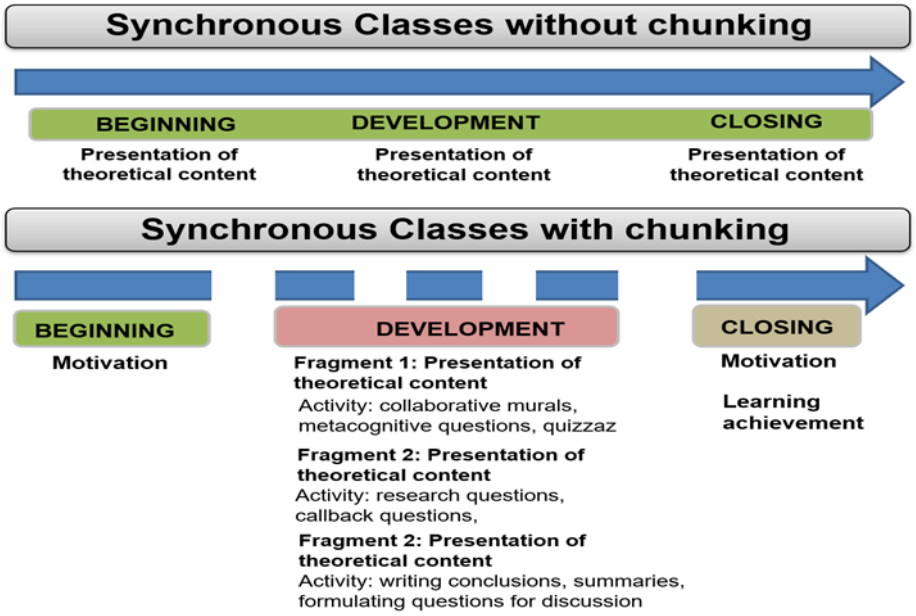

Figure 1. Synchronous classes without chunking and synchronous classes with chunking – a model

Regarding student motivation in the learning process involving chunking synchronous classes, the interview guidelines were elaborated, based on the adapted version of the Intrinsic-Motivation Inventory (Falkembach, 2015; CSTD, 2017); this was adapted by the authors, on the basis of the students' interest, level of enjoyment, perceived competence, value, usefulness, and pressure or stress. The interviews were conducted after each class via Google Meet, WhatsApp, and other technological tools.

Chunking in synchronous classes is a strategy that allows the teacher to manage the learning and align it with the ultimate goal, which is for the student to achieve better knowledge. Virtual synchronous classes that use chunking must divide the lesson into chunks of approximately 10 to 15 minutes for the students to learn a specific piece of information better. Abundant theoretical content in a specific period of time must be avoided. The first chunk must address one theoretical aspect, or one aspect of the planned content. The chunk that follows must present an activity, for example, a co-operative mural where students write their commentary on the theoretical aspect that was presented in the previous chunk. Consequently, a new chunk with different theoretical content must be introduced and, as previously stated, the next chunk must require the utilisation of an activity like a questionnaire, or a survey. Once again, a new chunk introduces new theoretical content; and it is chained to another chunk, together with an activity related to the content. Activity chunks can be introduced by using various resources and callback strategies or content reinforcement strategies such as online surveys, metacognitive questions, reflexive questions, research questions,

call-back questions, quizzes, writing conclusions, discussion questions, and many more.

2.3.1 Virtual-platform activities

Each professor had a meeting with the class to define the guidelines and lesson procedures by using the chunking technique. The lessons were imparted via the Google-Meet platform GRATUITA, considering the fact that the teachers and the students were in different places at the time. Progress in the activities that were planned were registered by using documents uploaded to Google Drive.

2.3.2 Application of a synchronous class by using chunking

Chunking synchronous classes must have certain characteristics. Checking the syllabus or the instructional guide, involving the 7 competencies, ensuring capacity and content, and making use of the evaluation system as the course, is always recommended. Also, there is the conceptual content and its distribution throughout the weekly class hours organised across different learning sessions, which must be planned ahead. Table 2 shows the procedure that was proposed for the synchronous lessons undertaken by using the chunking technique considering time, the division of the teaching-learning process, and the different strategies and technological tools available.

Table 2: Procedure for a synchronous lesson with chunking

Aspect	Description
Synchronous class chunking	- The 120-minute lesson is divided into chunks; each chunk is approximately 20 minutes long. - Each block has a content chunk and an activity chunk, one after the other. - The content or topics makes up the conceptual aspects of the lesson. They are specific. Addressing more than one topic in 20 minutes must be avoided. - The planning of activities is based on the strategies for retrieving and consolidating the knowledge related to the topic that is being taught.
Strategies for retrieving and consolidating knowledge	- Using knowledge retrieval and consolidation strategies that allow the student to learn a specific aspect better. - Some resources for knowledge retrieval and consolidation can include collaborative murals, metacognitive questions, questions for reflection, research questions, call back questions, quizzes, writing conclusions, formulating questions for discussion, summaries, consolidating knowledge activities, etc.
Use of technological tools	- Make use of existing technological tools in the virtual environments: nearpod, mentimeter, kahoot, padlet, socrative, etc.

The activity exercises strengthened the level of student participation in the interactive spaces despite the socially distanced world, in which they were living from December 2019 up until January 2021. Nonetheless, online synchronous classes have continued and the instructional process is different from in-person classes. Teachers have divided the teaching-learning process into blocks, and this

has helped the students to become interested. They are more likely to enjoy the activities that offer useful and valuable information.

2.4 Data analysis

The results of the effect of synchronous class chunking on the college students' intrinsic motivation have been analysed. The data were systematised by using the Atlas Ti version 22 software. This technological and technical tool is used to support the organisation, analysis and interpretation of the information in qualitative research.

3. Results and discussion

3.1. Emerging categories

After each synchronous class by using class chunking, the students and teachers were interviewed. From the analysis of the interview information, the categories and sub-categories emerged; and reports and codes were generated; this gave greater certainty to the words and actions of this study, which made it possible to recognise the intrinsic motivation of the students about this new way of teaching. The categories and sub-categories that emerged after the coding process are presented in Table 3. These categories were used to describe and explain the effects of chunking synchronous lessons on the intrinsic motivation of university students.

Table 3: Categories and sub-categories that emerged from lesson chunking and intrinsic motivation

Emergent Categories	Subcategories	Grounding
Active participation in interactive spaces	Mechanisms of intervention	36
	Distribution of information	32
	Didactic activities	28
	Interest during class	38
	Enjoyment in learning	30
Active listening in visual spaces	Verbal communication	29
	Written communication	25
	Exhibition of knowledge	24
	Reinforcement of learning	19
	Learning assessment	18
Use of technological tools	Development of digital abilities	33
	Digital competencies	27
	Technology-mediated learning	26
	Tension due to the use of digital tools	23

The analysis of the categories is based on the following: 1) Active participation in interactive spaces; 2) active listening in virtual spaces; and 3) the use of technological tools. Figure 2 presents the integrated network of categories and the sub-categories.

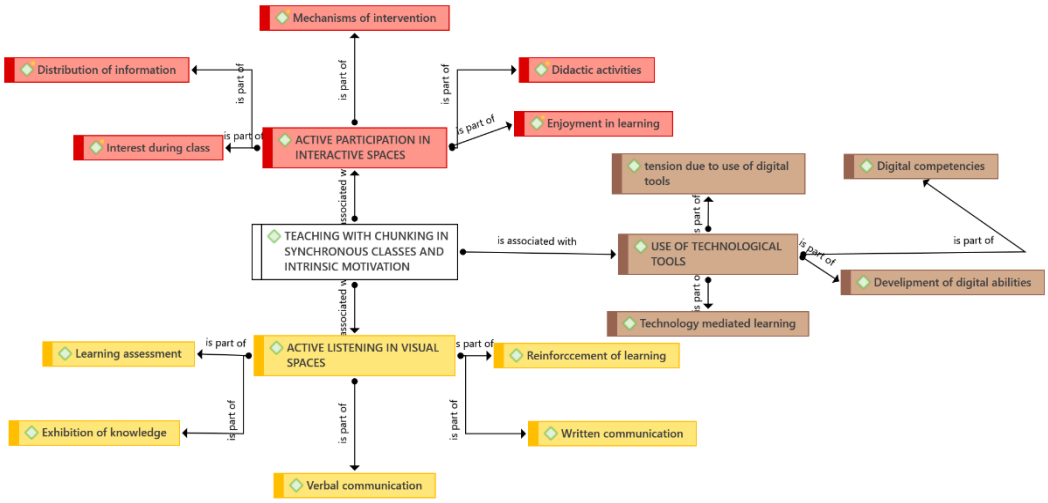

Figure 2. Integrated network of categories and sub-categories

The results of the effect of synchronous class chunking on the college students' intrinsic motivation have been analysed. The activity exercises strengthened the level of student participation in the interactive spaces, despite the socially distanced world, in which they were living from December 2019 up until January 2021. Nonetheless, online synchronous classes have continued; and the instructional process is different from in-person classes. Teachers have divided the teaching-learning process into blocks; and this has helped the students continue to feel interested. They are more likely to enjoy activities that offer useful and valuable information.

This aligns with what they stated in their study, when they suggested that synchronous classes must not be imparted without being divided into blocks, because the active pauses allow the students to focus and concentrate on different activities, enabling them to strengthen and retrieve information (Legault, 2019). In turn, this encourages the students' willingness to learn due to the dynamic nature of the process that excludes repetitive and routine-like teaching sequences.

3.2 Effects of chunking synchronous lessons on the intrinsic motivation of university students

3.2.1 Active participation in interactive spaces

Chunking in synchronous classes, as an intervention mechanism during the class provides the students with a space in which they can collaborate among themselves and be motivated to learn. One of the students interviewed stated that: *"The distribution of information is faster when using various communication channels, written or verbal, which makes it attractive."* In the same sense, a teacher declared that: *"Even though the planning of activities requires more work, such an effort because students are motivated and concentrated on the task getting the most out of the time we have in the teaching-learning process."*

The results provide evidence that the students consider chunking and splitting the lesson content to be an innovative way of giving classes; because it is a dynamic and productive methodology that includes the different strategic

activities of retrieval and the consolidation of knowledge and learning. In addition, educators appreciate the fact that synchronous lessons that use chunking provide the possibility of linking different topics with purposeful instructional actions that strengthen and improve professional training. In this regard, Machuca et al. (2021) suggested that the implementation of the pedagogical methodologies of intervention help to construct learning, maintain interest, and facilitate enjoyment of the experience and that which was learned. This can be considered a contribution to the development of the teacher and student discourse, as well as their abilities, and skills.

The promotion and implementation of chunking in synchronous classes had an effect on participation, which was important in relation to teamwork. It made the students feel interested in working on the activities between blocks in real-time during the lesson. The students' interest was demonstrated by their many levels of participation. Instructional strategies accelerate and stimulate the level of student participation in class, an element that indicates their motivation to listen and learn new things (Adedoyin & Soykan, 2020).

3.2.2 Active listening in visual spaces

Not knowing how to listen with intent represents most of the problems related to the comprehension of a message relayed through verbal or written communication. For this reason, teachers try to implement methodologies that improve the student's basic skills when in the listening space. The chunking of synchronous lessons requires active listening to the instructions and guidelines that permit taking advantage of the time they had for the class content and activities. One of the students reported: "*During the lessons, teachers transmitted confidence and dominion over the topic, which improved attention and visual contact through the screen.*"

During the synchronous classes divided into chunks for the writing and composition course, active listening among the teachers and students emerged, thereby demonstrating that feedback brought about benefits. This resulted in a dialogue for the development of the lesson content, as well as its utility and value. It reconstructed the knowledge and generated important experiences. Active listening in the teaching-learning process is generated when engaged in dialogue, in which the transmitter of information demonstrates security and confidence, and the receiver understands – because of the freedom they show when they act and transmit their emotions to others. Interpersonal relations that might affect the students must also be considered (Stecula & Wolniak, 2022). The students were able to comprehend, reason, and analyse the lesson content without a problem; because the communication in the synchronous lesson was fluent, due to the clear and precise ideas that were taught by the professors, as well as the pauses between blocks that were used for activities and allowed the students to avoid distraction.

3.2.3 The se of technological tools

The retribution of COVID-19 has been felt worldwide (Besche et al., 2022). The area of education suffered a great impact because in-person classes switched to online classes in the form of two modalities: synchronous, which provides real-time encounters and interactions and asynchronous, based on instructional

material that is available at all times. This is where the student can download and check it at any time. Frequently, they like to construct their own learning experience (Bhadri & Patil, 2022).

The new way of imparting synchronous classes through chunking by structuring blocks that are planned by the teacher contributes to the reinforcement of knowledge. This has been the result of a year of ups and downs in instructional practices and the development of digital skills that not everybody previously had. Nonetheless, a student reported that "*Technological skills have been acquired through online classes*". These experiences have enabled the observation of strengths and weaknesses. Additionally, another student stated that "*Regarding the weaknesses, allotting more time for activities is needed; because most of the time we feel pressure and tension when there is not enough time to finish them. And as for strengths, the whole dynamic makes content and explanations clear because we can solve any questions we have, unlike in asynchronous classes.*
"
An educator participating in the study commented that "*Regarding the weaknesses that they had to endure during the pandemic, there is the lack of tutoring that impells them to look for information and construct their own learning, investigate on their own, and acquire digital skills, which becomes a challenge due to the scarce use of computers and the variety of technological tools that the internet offers for teaching*". Additionally, one of the teachers revealed that: "*We have been able to properly apply chunking in synchronous classes, due to the experience and practice we have had in teaching online classes, which we could not have done before; because we kept postponing our training in the use of ICTs.*"
Evidence suggests that teachers who have adopted the digital- transformation process have a better chance of conquering the challenges found in education, meaning that they will experience both the advantages and the benefits. Students of today use and manage technology in a better way than their immediate predecessors (Bacus et al., 2022). Thus, it is evident that chunking in synchronous classes is beneficial when it comes to training topics related to courses conducted in a virtual environment. This relates to the students' responsibility over their learning process, generating an interactive and collaborative potential between the teacher and the student. It also saves time while optimising both resources and learning strategies.

In this sense, the results show that chunking in synchronous classes has an effect on intrinsic motivation among the college students. This has contributed to the newer generations being familiarised with digital culture. Continuing with the previous idea, teachers have incorporated real-time access to media and technology into their content blocks. This has strengthened the teacher's pedagogy centred on instructional practices (individual and group experiences and activities for learning), informative aspects (materials and resources for studying), communicative aspects (student-student, teacher-teacher, and student-teacher online social interaction), tutoring, and evaluation (teacher supervision and learning assessment).

The proposal is that teaching should be informative and a guided, communicative and evaluative practice, as opposed to the traditional methodologies used for the

reception and transmission of information that lack usefulness and meaning, as Chan and Tang (2023) state. This progression is made through innovations that integrate computer networks, facilitating the dynamic process of knowledge construction, due to the variety of resources that can be used and new ways of organising the lessons for their correct acquisition. Senthilkumar and Kannappa (2017) said that with reference to the studies related to the use of technological tools during the education done in the pandemic, it was concluded that the learning increased significantly. This is a challenge for teachers in their academic work.

4. Conclusion

When analysing the influence of chunked teaching in synchronous classes on intrinsic motivation, the results show that this way of teaching a lesson prompted an interest among the students in learning the content of the lesson in a different way. In addition, it should be emphasised that the contents learned by the students had to be meaningful via active participation, attention to the topics developed, active listening, and the use of technological tools.

The results show that following the implementation of synchronous classes by using the strategy of class fragmentation, there was greater active participation of the students in the interactive spaces developed. This new form of teaching was considered by the participants to be innovative, dynamic and to have a greater impact on the students. It could also be considered one of the best practices of the online modality in real-time because the pandemic education has presented difficulties for both students and teachers. This was a new scenario, in reference to shared virtual learning.

This new way of directing and managing the online teaching-learning process through block teaching facilitates the students by giving them the opportunity to interact, avoiding dissatisfaction, fatigue, and distractions; since the pauses between the content blocks actively incorporate exercises and activities that motivate, feedback, consolidate, and reinforce attention, concentration, and content assimilation skills.

Teaching in chunks in synchronous classes was found to be positive and significant in relation to the intrinsic motivation of the college students; because they responded and participated immediately during the activity block. The the students showed motivation for the topics developed; they also showed an interest in learning during the class through active participation with the development of the different didactic strategies used in the different teaching moments. They showed their attention to the work they were doing; and they were actively listening and captivated by the collaborative work; since all of these important elements are needed to strengthen individual and the collective learning.

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