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FLED LEARNING DESIGN FOR FLEXIBLE EDUCATION

CONCEPTUAL FRAMEWORK FOR FLEXIBLE LEARNING DESIGN: THE CONTEXT OF FLIPPED CLASSROOM

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1. Executive Summary

The paper presents a conceptual framework for flexible learning design, specifically focusing on the context of the Flipped Classroom (FC). The aim is to provide a comprehensive understanding of flexibility in learning environments and course designs, as well as explore emerging flexible modalities. The paper also underlines the theories underlying flexible learning design and discusses the implications and considerations associated with implementing such approaches. The introduction highlights the role of flexibility in education and introduces key discussions. The conceptual framework section defines flexibility and explores its various dimensions, establishing a foundation for the related arguments. Next, the paper discusses the theories that underpin flexible learning design, providing insights into the pedagogical principles and approaches that support this educational paradigm. It further explores flexible learning environments, addressing the key elements and characteristics that contribute to their effectiveness. The subsequent sections elaborate on the specific aspects of flexibility in different learning settings. It explores flexibility in F2F, blended, and online learning contexts, highlighting the unique considerations and strategies for each modality. This is followed by the presentation of emerging flexible modalities, discussing their potential benefits and challenges. The paper also emphasizes the critical role of flexibility in teaching and learning exploring how flexibility impacts what and how students learn, the delivery of instruction, didactic strategies for organizing learning activities, provision of learning resources, and the assessment and evaluation process. Furthermore, the concept of flipped learning is discussed as a flexible design, showcasing its potential as an effective approach to flexible learning. It provides practical suggestions and potential strategies for implementing flexible design within the framework of flipped learning. The literature review section synthesizes existing research on students' and teachers' perceptions of the effectiveness of the FC where the benefits and challenges associated with flexible learning approaches are explored and discussed. The paper concludes with implications and considerations for implementing flexible learning design with a discussion on the importance of student agency in taking control of the learning experience, overcoming institutional barriers, balancing planned and spontaneous flexibility, and designing for students with special needs. The paper offers a comprehensive exploration of flexible learning design within the context of the flipped classroom. It provides valuable insights into the conceptual framework, theories, practical strategies, and implications associated with implementing flexible learning approaches. The findings and recommendations presented in this report aim to inform teachers, educators, policymakers, and researchers in their efforts to promote effective and adaptable learning experiences while designing a flipped learning in their classroom.

2. INTRODUCTION

This conceptual paper aims to establish a framework for flexible learning designs situated within the context of flipped learning. Our goal is to identify design features which can promote inclusivity and flexibility in the development of pedagogical tools for effective flipped learning. Drawing on existing literature and research in this field, we provide an overview of the concept of flexible learning design, its importance, and how it can be embodied in practice. We also present a comprehensive review of the existing literature on flexible learning design, including its definition, theoretical underpinnings, and related concepts. To establish the conceptual framework, we include key principles, components, and models that provide a clear and coherent explanation of the concept. Furthermore, we provide various examples of how the framework can be applied in practice, including case studies, best practices, and examples of successful implementation. Finally, we discuss the implications of the framework for higher education, reinforcing the critical role of flexible learning design in promoting inclusive and playful learning experiences.

3. CONCEPTUAL FRAMEWORK

Flexible learning design is a method or a teaching delivery mode, which involves the process of designing educational experiences or learning scenarios that can be applied to educational contexts to promote new and productive solutions to complex instructional and interactional challenges that might be hindering students from engagement in learning and attendance to the courses. One area where such an approach can be particularly applicable can be found in flipped learning models, in which the traditional classroom instruction is flipped and students access course materials before class so that they can engage in active, collaborative, and effective learning during class time and beyond where students find more opportunities for feedback. However, the FC is frequently misunderstood. For instance, some argue that teachers' workload is reduced by incorporating pre-recorded materials. However, in reality, it may even increase as teachers need to generate and prepare in-class tasks that foster higher-order thinking skills (Filiz & Kurt, 2015). Therefore, there is a need for a structured pedagogical framework to support teachers in designing effective flipped learning scenarios.

The FC model can make higher education more flexible (Brewer, & Movahedazarhouligh, 2018), which is crucial for several reasons. First, it can provide personalized learning opportunities for every student who has unique needs, interests, and learning preferences (Chen, Liou, & Chen, 2019)) so students can customize their learning experiences. For example, they can select from a variety of courses, majors, and programs that align with their career goals and personal aspirations, thus enhancing their engagement, their motivation, and the satisfaction with the overall course plan and the program design. Secondly, it might offer a study-life balance for those students who have other responsibilities such as part-time jobs, family obligations, or other personal commitments (Haukås, Pietzuch, & Schei, 2022). This helps them use and manage their time more effectively and set a balance between study and their lives, which can help minimize stress, burnout, while increasing their chances of degree completion. Thirdly, flexibility enables the access to diverse students who may not be able to attend traditional on-campus classes due to geographic, financial, or personal constraints so they must access education remotely (see Clark, Kaw, Lou, & Scott, 2022). Therefore, online course designs and distance learning programs can accommodate different students, ensure inclusivity, and respect diversity and increase accessibility. All these

can be enabled through the use of technology and digital platforms where students can study in flexible programs and engage in courses flexibly with a mixture of synchronous and synchronous participation (Lakhal, et al., 2021) However, it is essential that teachers are supported in designing courses that promote self-regulation and flexibility through a teacher learning design that helps them to help to improve or to make choices to promote effective learning, such as the flipped classroom, which promotes self-regulated learning. Flipped learning can be seen as an umbrella term that encompasses a range of approaches to teaching and learning, but it is important that teachers have a clear understanding of the pedagogical principles underpinning these approaches to ensure that they are inclusive and engaging because the FC may exclude some students with little access to technologies or digital competence (See O'Flaherty & Phillips, 2015).

To ensure that flipped learning is inclusive and accessible to all students, it is important to structure and support inclusive flipped learning scenarios (Jenkins, et al., 2017), which can be conducted by digital tools and support a decision-making process with emphasis on the needs of all students, including those with special needs and disabilities. This can be particularly relevant in the FC model, where students are expected to take a more active role in their own learning (Sointu, 2023). It is also important to increase awareness of flexible learning, including the FC model, and its potential benefits for both teachers and students.

In addition to these theoretical arguments in the literature, in our meetings we discussed how we conceptualised flexibility as the project cohort. The partners discussed different aspects of flexibility in the flipped classroom model. They focused on understanding flexibility in terms of inclusivity, learning styles, approaching tasks, individual work, choice of interaction patterns, and multimodality options for flexible learning which are detailed below:

Flexibility in terms of inclusivity:

Regarding inclusivity, the partners emphasized the importance of ensuring that students with diverse needs and backgrounds feel included and supported. They explored strategies such as providing accommodations, captioned videos, transcripts, and alternative formats for materials.

- It was discussed how flexibility in the flipped classroom model can contribute to inclusivity.
- Ensuring that students with diverse needs, backgrounds, and abilities feel included and supported.
- Providing accommodations and resources to address individual learning requirements.
- Exploring strategies such as captioned videos, transcripts, and alternative formats for materials.

Flexibility in terms of learning styles:

When it came to learning styles, the partners recognized that students have different preferences and ways of learning. They discussed the need to adapt instructional strategies to accommodate visual, auditory, and kinaesthetic learners. They emphasized the importance of offering a variety of resources and activities to cater to different learning modalities.

- Recognizing that students have different learning styles and preferences.
- Adapting instructional strategies to accommodate visual, auditory, and kinaesthetic learners.
- Incorporating a variety of resources and activities to cater to different learning modalities.
- Encouraging students to engage with content in ways that resonate with their preferred learning style.

Approaching tasks with flexibility:

Approaching tasks with flexibility was another key topic. The partners agreed that allowing students to have different entry points and paths to reach learning objectives is crucial. They highlighted the benefits of providing choice and autonomy in selecting tasks or assignments and encouraging creativity and divergent thinking in problem-solving activities.

- Emphasizing the importance of allowing students to approach tasks in flexible ways.
- Allowing for different entry points and paths to reach learning objectives.
- Providing choice and autonomy in selecting tasks or assignments.
- Encouraging creativity and divergent thinking in problem-solving activities.

Individual and independent work flexibility:

The partners also acknowledged the significance of individual and independent work in the flipped classroom. They discussed the importance of providing opportunities for self-paced learning, self-directed exploration, and offering flexible deadlines or extended time for assignments. They aimed to promote self-regulation skills and foster a sense of responsibility for learning.

- Acknowledging the significance of individual work and independent study.
- Providing opportunities for self-paced learning and self-directed exploration.
- Offering flexible deadlines or extended time for assignments to accommodate individual needs.
- Promoting self-regulation skills and fostering a sense of responsibility for learning.

Flexibility in choice of interaction patterns:

When it came to interaction patterns, the partners recognized the value of having varied options. They discussed the benefits of different group sizes, such as small groups, pairs, or whole-class interactions, depending on the task or learning objective. They emphasized the need to provide opportunities for collaborative work, peer feedback, and discussion while also balancing it with individual reflection and independent study.

- Recognizing the value of varied interaction patterns in the flipped classroom.
- Allowing for different group sizes (small groups, pairs, or whole class) depending on the task or learning objective.
- Providing opportunities for collaborative work, peer feedback, and discussion.
- Balancing structured group work with individual reflection and independent study.

Multimodality options for flexible learning:

Lastly, the partners highlighted the importance of multimodality in creating a flexible learning process. They discussed the need for resources and materials in various formats, including text, audio, and video. They emphasized the incorporation of multimedia elements such as images, diagrams, and interactive simulations. Providing multiple means of representation and expression was seen as essential to accommodate diverse learners.

- Highlighting the importance of multimodality in creating a flexible learning process.
- Offering a range of resources and materials in various formats (text, audio, video).
- Incorporating multimedia elements such as images, diagrams, and interactive simulations.
- Providing multiple means of representation and expression to accommodate diverse learners.

To move forward, the partners identified several action items. These included researching and gathering resources on inclusive practices, exploring instructional strategies for different learning styles, developing guidelines for flexible task approaches, implementing mechanisms to track and support individual work, providing training on facilitating different interaction patterns, and curating multimodal resources for a flexible learning experience.

3.1 WHAT IS "FLEXIBILITY"?

Flexible learning can be defined as a method that eliminates the restrictions of time, location, and pace, which involves providing students with pedagogical choices that address their individual requirements, such as the scheduling of classes, course materials, teaching methods, learning resources, physical location, technological integration, completion timelines, and modes of communication (Huang et al., 2020 as cited in Fructuoso, Albó, & Beardsley, 2022). Fructuoso et al. (2022) discussed the concept of flexible teaching and learning within the FC context. Traditionally, flexible learning is meant to overcome time, place, and pace limitations. Currently, flexible learning also includes offering choices to learners based on their individual needs (e.g., class times, course content, instructional approach, learning resources and location, technology use, completion dates and communication medium). Flexible teaching focuses on improving student learning by allowing instructors to make choices about the design and delivery of their courses. Similarly, Noguera et al. (2023) explored the flexibility of the FC(FC) model in higher education. Specifically, they examined how well a course design could be adapted to various teaching delivery modes without compromising student satisfaction and learning outcomes. Results indicated that FC could adjust to diverse teaching modes while still upholding student satisfaction and learning outcomes. From a teaching perspective, flexible teaching refers to an approach in course design and delivery that enables students to learn and succeed regardless of the mode of instruction, be it F2F, online, or hybrid (Duke Learning Innovation, 2022). Similarly, according to Noguera, et al. (2023), flexibility is defined as the pedagogical model's ability to adjust and accommodate various teaching modes, including F2F, online, blended, or hybrid approaches where didactical implementation is more appropriate (Andrade & Alden-Rivers, 2019). We argue that the FC as a form of blended learning can facilitate both flexible teaching and learning in educational settings where relevant and necessary.

Flexibility is often associated with embedding pedagogical learning-supportive choices in the course design so students can customize the course according to their own needs, for example choosing to attend F2F or online sessions with no "learning deficit" (Beatty, 2019) in one of three modes: F2F , synchronous, and asynchronous (Smith & Hill, 2019). Therefore, students might be able to choose from the modes and decide to attend in person or online, as well as synchronously or asynchronously. Flexibility is embedded in the course design by the teachers for students to be able to adapt to the delivery of the course in ways that suit them with considerations of institutional restrictions or permissions. The courses characterized as flexible make the learning ubiquitous, allowing for learning anytime and anywhere as a result of the alternatives practices for participation and access to the course without the limitation of time, place and pace (Huang et al., 2020). Flexible learning often promotes equity and access (Benade, 2019), provides an effective learning environment using technology (Müller & Mildenberger, 2021), and enhances self-regulated learning strategies (Kim, et al., 2021)

The pedagogical choices can come in various ways which for example include the modalities of learning (content and material), mode of delivery (online or F2F), mode of participation (synchronous or asynchronous). Flexibility in course designs has been an important aspect of course designs in recent years though due partly to the lockdowns including school and universities, it provides opportunities and spaces for self-regulation of own learning which increases students' engagement in content, interaction, and instruction.

Figure 1: Hybrid, Blended Learning Environment (Howell, 2022)

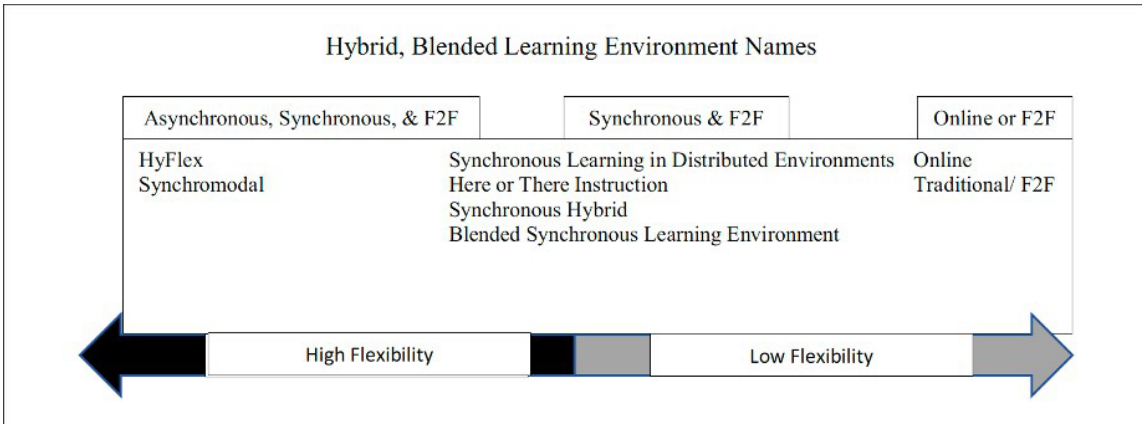


Figure 1 represents the high flexibility ensured and enacted by Hyflex synchro-modal that combines different modes of
participation and delivery while low flexibility is associated with and attributed to monomodal course delivery imposing a single mode of participation: either only online or only F2F .

The flexibility also denotes how teachers make flexible time of class, mode of delivery, mode of resource sharing, modes of assessments, and mode of communication (Collis, Moonen, & Vingerhoets, 1997). It can also involve flexibility of place, time, pace, learning resources, digital technologies, learning activities, grouping, spaces, assessment, and teaching delivery mode (Noguera, et al., 2023). Such course designs involving the patterns of flexibility are described as having flexible pedagogy (Gordon, 2014) especially because they offer flexible

delivery (Lundin, 1999). Garrison and Vaughan (2008) also define flexible learning as "a mode of delivery that allows learners to choose the pace, place, and mode of their learning, and that supports their individual learning goals and preferences." Another definition of flexible learning design is provided by Littlejohn and Pegler (2007), who describe it as "an approach to education that provides learners with choices about how, what, when, and where they learn, and that takes into account their prior knowledge, skills, and experiences." In this sense, flexible learning design involves a learner-centred approach that recognizes the diversity of learners and their individual needs and preferences.

However, designing the courses as flexible does not necessarily mean that those choosing one format have more advantages or learn better (Beatty, 2019). To ensure that, the activity in all formats needs to explicitly support learning in similar ways. Beatty (2019) also emphasizes that the content of the courses needs to be presented effectively and professionally, that the course activities need to engage learners with generative learning activities, and that the teacher needs to use authentic assessment to evaluate student learning. Such designs increase the accessibility of the courses for a larger group of students if they adopt the following fundamental values that characterize flexibility particularly in hybrid-flexible course design as suggested by Beatty (2019) in what follows:

Learner Choice: Choice is key to flexible course designs without which flexibility is hardly ensured. Providing choice of participation for students is fundamental to enabling flexibility, for example, in the course completion process. Students should be allowed to choose meaningful alternative participation modes and they need to be able to make such choices daily, weekly, or topically.

Equivalency: Equivalence in learning should be secured regardless of the model of participation students choose. They need to be able to access all the learning activities and achieve the equivalent learning outcomes in all participation modes.

Reusability: The in-class artifacts can be reutilized in the online learning objects or vice versa. For example, audio or video recordings, their transcripts, course presentations, and other materials can be converted to other modalities from verbal to written so that they can be used by diverse students and in various environments for a multitude of purposes.

Accessibility: Accessibility is enabled by course materials and activities accessible to all students and is also key to making it possible for students to participate in alternative modes. To achieve that, students need essential technological facilities with which they need to be equipped and the varied learning-mode abilities which help them make legitimate choices about participation.

All these principled values can help teachers develop and construct flexible learning designs. So, to ensure flexibility is practiced and embraced, there are four key characteristics we need to keep in mind: optional, equivalent, reusable, and accessible. Now we discuss how the conceptualization of flexible learning looks like in the learning environments.

3.2 Dimensions of flexibility

Flexible learning can be embodied through different forms and take place at various levels according to Casey and Wilson (2005). These levels involve teaching and learner management,

operational management, and institutional management. 'Teaching and learner management' not only involves the methods to be followed and strategies to be developed by the teachers but also how learning is to be managed through personalized, self-paced, and choice-oriented especially in relation to the competences and learning outcomes, assessment and evaluation processes, and resources for learning and engagement. 'Operational management' dimension requires a kind of flexibility that facilitates the delivery of courses and support mechanisms while students are flexibly engaged in their learning. On the other hand, 'institutional management' involves how institutions open spaces for flexible designs and allows programs to be open to multiple faculties and enables students to complete their degrees with interdisciplinary background by self-selecting courses across diverse programs. These might include alternative scheduling, alternative modes of delivery as well as alternative assessment methods that could make the flexible components and elements stronger. Table 1 summarises these levels:

Dimension	Description
Teaching and learner management	- Involves methods and strategies developed by teachers - Manages learning through personalized, self-paced, and choice-oriented approaches - Focuses on competences, learning outcomes, assessment, and evaluation processes - Provides resources for learning and engagement
Operational management	- Facilitates the delivery of courses and support mechanisms - Promotes flexibility in student engagement and learning
Institutional management	- Opens spaces for flexible designs within institutions - Allows programs to be open to multiple faculties - Enables students to complete degrees with interdisciplinary backgrounds - Supports self-selection of courses across diverse programs - Incorporates alternative scheduling, modes of delivery, and assessment methods to enhance flexibility

Table 1: Levels of flexible learning

Moreover, the flexibility as a practice depends on when and where learning occurs and how flexible learning can be achieved through various means and schedules. Students could decide when to contribute to and join in a course, when to start and finish the tasks and assignments, and at what pace they want and need to study (Casey & Wilson, 2005). Students can also decide on when they want to engage in interaction with others and the amount of time they want to study on their own (Collis, 2004). Furthermore, the ways in which students can carry

out learning activities and access learning materials can correspondingly remain flexible, including campus, home, or public transport, using mobile devices (Gordon, 2014). However, we should bear in mind that creating overflexible program and course designs can lead to where we offer excessive flexibility to students might result in negative consequences. Although flexibility is often considered a positive attribute in education, overflexibility can lead to several drawbacks. For example, overly flexible programs might lack a well-defined structure or progression since students are affiliated with multiple faculties and knowledge paradigms which might make it hard for them to connect all these learning outcomes. They might also access reduced guidance from teachers in multiple faculties. Although being exposed to interdisciplinary knowledge is important and necessary, students might choose courses or modules which may not lead to a well-rounded educational experience and a consistent group of courses, and they might develop an unbalanced skills set, and knowledge basis might vary among all students from the same faculties. Therefore, providing students with excessive options might be detrimental to their learning rather than facilitating their knowledge and skills construction.

However, flexibility has become more and more essential and needs to be integrated into the educational models especially since the COVID-19 pandemic. Education can be redesigned and reorganized into the new mode of participation and mode of delivery as being online learning. For example, one can discontinue physical class gatherings and integrate learning tasks and resources by making them accessible online and enabling students to complete them at their own pace and location. Therefore, students can display and perform greater control over the learning process and experience and adapt more swiftly to their own individual needs and those of the circumstances in which they learn. However, it is also crucial to remember that students can feel disoriented or ignore preparation activities that are essential for in-class interaction.

4. Theories Underlying Flexible Learning Design

There are several learning theories that are closely related to the concept of flexible learning designs, including constructivism, social constructivism, and connectivism. These theories all prioritize learner-centeredness in design, recognizing that students are active constructors of their own knowledge and meaning through both their experiences and their interactions with the environment. Constructivism emphasizes the active role that students play in constructing their own understanding of the world around them (see Fructuoso, et al., 2022). Regarding the constructivist theory, an essential aspect to emphasize is the concept of constructing knowledge by building upon existing knowledge. This notion aligns with the opportunities provided by flipped classrooms to adapt to students' needs and offer diagnostic assessment tasks, facilitating an active learning process (see Fructuoso, et al., 2022). In a flexible learning design, the principles of constructivism can be applied in various ways, such as providing students with opportunities to build their own knowledge and meaning through pedagogical collaborative activities like task-based, inquiry-based, and project-based learning, all of which are oriented towards problem-solving in general. This approach to learning allows students to take an active role in the learning process, which can lead to more meaningful and long-lasting learning outcomes, thus leading to deep acquisition and longer long-term retention of knowledge.

Flexible learning design is underpinned by the theoretical perspectives of self-regulated learning (SRL), which emphasizes the importance of students taking an active role in their own learning by setting goals, monitoring progress, and adjusting learning strategies, as outlined by Zimmerman (2008). SRL consists of three key components: cognitive strategies, which involve learning processes such as rehearsal and elaboration; metacognitive strategies, which include self-monitoring and regulating of learning, such as setting goals and evaluating progress; and behavioural strategies, which involve managing one's own behaviour, such as time management and seeking help when needed. A flexible learning design that integrates SRL principles provides opportunities for students to engage in self-directed learning, set their own goals, and critically reflect on their progress, thereby developing skills and practices that will support them as lifelong learners.

The third theory that informs and underpins flexible learning designs is social constructivism, which highlights the role of social interactions in the learning process through social and collaborative engagement in learning. Vygotsky's (1978) theory of social constructivism proposes that learning is a social activity, and that knowledge is co-constructed through interactions with others who can provide support when needed and help in the right way, referred to as the zone of proximal development. In flexible designs, there are instances. when students begin to learn based on their own mental and intellectual resources, but eventually, they may encounter complex topics that they cannot understand and learn on their own. At this point, seeking support from others becomes necessary for meaningful learning, as social constructivism emphasizes. A flexible learning design that integrates social constructivist principles could offer opportunities for students to collaborate with others, such as through group projects or online discussions, which offers flexibility to manage teams, to select a topic or to meet which could in turn benefit the FC. By doing so, students can benefit from the diverse perspectives and experiences of their peers and develop their own understanding through shared experiences. Such an approach would allow students to construct their knowledge and meaning by interacting with others, which could enhance their learning experiences and outcomes. The FC(FC) model can be theoretically grounded in the social cultural theory to support its pedagogical practices. The FC model aligns with the social constructivist approach, which emphasizes that learning is a social activity and higher mental activities are mediated (Vygotsky, 1978). According to Zimmerman (2000), an effective FC scenario should promote student self-regulatory skills during the forethought, performance, and self-reflection phases, which align with the notion of self-regulation and co-regulation in sociocultural theory.

Theoretical Perspective	Description
Constructivism	- Students actively construct knowledge and meaning - Flipped classrooms provide opportunities for active learning - Pedagogical activities (task-based, inquiry-based, project-based) enhance problem-solving skills
Self-Regulated Learning (SRL)	- Students take an active role in their own learning - Set goals, monitor progress, and adjust learning strategies - Develop skills for lifelong learning - Learning is a social activity

Theoretical Perspective	Description
Social Constructivism	- Co-construction of knowledge through interactions with peers - Collaboration and shared experiences enhance learning
Sociocultural Theory	- The FC model aligns with the social constructivist approach - Learning is a social activity and higher mental activities are mediated - Effective FC scenarios promote student self-regulatory skills and align with self-regulation and co-regulation in sociocultural theory

Table 2: Theoretical perspective of flexible learning

In the FC model, students engage in self-paced learning using mediational tools such as uploaded materials (text and videos) provided by the teacher, which regulate their cognitive activity and facilitate the acquisition of factual knowledge. This is in line with Vygotsky's concept of mediation, which refers to the process through which culturally constructed artifacts, concepts, and activities are used to regulate one's own and others' mental activity (Lantolf & Thorne, 2006). The FC model provides opportunities for students to semi-construct their knowledge and thought processes, preparing them for social mediation during synchronous classes where collaborative conversations with social mediators including teachers or peers can take place to develop their cognition. This social mediation in the FC model promotes co-regulated learning, where students engage in discussions, ask questions, and seek assistance from mediators to bridge the gap between their individual capabilities and potential ability in the Zone of Proximal Development (ZPD) as proposed by Vygotsky (1978).

Furthermore, the FC model promotes student-centred learning and ownership of learning (Cho, et al., 2021) as students have the flexibility to choose when and where to study, access uninterrupted learning materials, and adapt the learning process to their special educational needs, prior knowledge, and interests (Hartyányi et al., 2018). This aligns with the sociocultural perspective that learning is situated in a social context and is influenced by the cultural tools and resources available (Vygotsky, 1978). The FC model also fosters shared responsibility for learning between the teacher and students, as the design of learning activities and synchronous class time for discussion and answering questions are in line with the scaffolding instruction and social interaction supported by sociocultural theory (Lantolf & Thorne, 2006).

Noguera et al. (2023) in a similar vein summarized the main characteristics of the learning theories and their applications in the digital society. From her perspective, constructivism and social constructivism remain alive and essential in the current technology and digital communication era. These theories emphasize the importance of active learning, collaboration, and critical thinking, which are essential skills for success in the digital age. The FC is supported by these two theories. Constructivism is a learning theory that emphasizes the active role of learners in constructing their own knowledge and meaning from their experiences. In a flipped classroom, constructivism is supported by the fact that students can consult resources at their own pace and review the material as many times as they need to. The assessment and learning activities can be adjusted to their prior knowledge and learning needs. Social constructivism emphasizes the social aspect of learning. According to this theory,

learning is a socially mediated process where knowledge is built with and from others. In a flipped classroom, social constructivism is supported by the fact that students can work together on exercises, projects, or discussions in class.

In conclusion, the FC model can be theoretically grounded in sociocultural theory, as it aligns with the constructivist and social constructivist approaches, promotes self-regulation, co-regulation, student-centred learning, and ownership of learning. It provides opportunities for social mediation, where students engage in collaborative conversations with social mediators, and supports the Zone of Proximal Development. By integrating the theoretical underpinnings of sociocultural theory, the FC model can be designed and implemented effectively to promote meaningful and engaging learning experiences for students. From these theoretical standpoints, research also shows that the FC is appropriate for blended learning in various studies (Campillo-Ferrer & Miralles Martínez, 2021; Hew et al., 2021; Othman et al., 2022;

Sadiq & Mahejabin, 2022 as cited in Noguera, et al., 2023). Recent studies have proven that face-to-face (from now on F2F) flipped designs can be adapted to the online mode by transforming the in-class activities into synchronous technology mediated activities and the study time into asynchronous technology-mediated work. Such online FC design have increased student engagement and performance (Beason-Abmayr et al., 2021; Gopalan et. al., 2021; Jia et al., 2022; Latorre-Cosculluela et al., 2021; Romero-García et al., 2021; Ruiz-Jiménez et al., 2022). Nevertheless, Weiss and Friege (2021) warn that there is a risk of applying FC under a reductionist and inefficient view of technologies.

5. Flexible learning environments

Flexible learning environments are aligned with 'open learning' which positions students as independent and self-determined and challenges them to learn in an autonomous way while teachers undertake the role of learning facilitators. Such environments allow students space to navigate and negotiate their personalization of learning as well as increasing the chances of adaptivity to the flexible interaction patterns and structures of course designs. Student-centeredness underlines the theoretical underpinnings of such distributions of roles and responsibilities during the learning process with an emphasis on peer collaboration (Lin & Hwang, 2018). However, to enact these roles and responsibilities, students and teachers need barriers to be removed which could restrict students' attendance in the content such as classroom or online. This ensures a 'flexibly accessible learning environment' a term acronymized as FALE and developed by the University of Georgia in 2018.

Flexible learning provides students with a wide range of pedagogical choices of engagement in course content materials, tasks and activities and interaction and procedural control over how, when, and where to engage and complete them. According to Goode et al. (2007), flexible learning offers students a choice-rich learning environment which challenges them to study the topic from multiple dimensions and to discover their personal interests and preferences for learning in particular ways. Such orientation is regarded as a learning practice that is theoretically explained by a learner-centred constructivist (Goode et al., 2007). This also stresses the prominent educational move from the traditional teacher positioning as undertaker of pedagogical responsibilities to the responsible autonomous learner undertaking the control over their learning. However, this repositioning of learners to be agentic and self-

determined also demands them to be more skilful in self-regulating (by goal setting, self-monitoring, and adjusting), whereas teachers are supposed to encourage active learning and design the learning process as being deeply engaging and highly effective (Collis, 2004). Students can also find the opportunity to co-regulate their learning in the FC designs when supported with collaborative engagement activities where pre-exposure and beyond is provided in flexible forms. Flexible learning therefore can allow for creating and designing an adaptable, dynamic, and customized experience of learning, thus addressing the distinctive needs, personal preferences, individual goals of diverse students. Similarly, flexible teaching allows for designing and delivering courses that enables students to learn and succeed in any mode, including F2F, online, or hybrid. According to them, a flexible teaching model acknowledges that learners have diverse needs and preferences for learning, which can be addressed by a design that prioritizes adjustable personalized learning across different modes of instruction.

6. Flexibility in course designs

Flexibility in course designs can come in various ways depending on the modality of the course delivery and participation. It could be integrated in various course designs in F2F , online, and in-class pedagogical practices, which might be supported by digital integration where digital technologies offer more possibilities for flexibility of time and place. This makes the online environments as the mediator and hub for implementing flexible designs and embodying flexibility.

6.1 Flexibility in F2F learning

Flexibility in F2F learning designs refers to the ability to adapt and accommodate diverse students' needs and expectations within the context of traditional classroom setting. Teachers are expected to incorporate methods that offer personalized learning experiences, collaborative activities, and interactive tasks where students engage in hands-on and experiential process of learning. For example, to offer flexibility in the classroom environment, teachers employ differentiated Instruction where they tailor their instruction to meet the individual needs, interests, and learning styles of the learners through a variety of instructional techniques, materials, and diverse ways of assessing student learning. Teachers can further enhance flexibility in F2F learning designs by varying the grouping criteria, such as considering high and low achievers or implementing gender-sensitive grouping, for collaborative tasks. This approach creates a safe environment where students feel supported and can benefit from interacting within their groups. In addition, teachers can implement diverse patterns of co-working, such as whole-class discussions, small group activities, or one-on-one interactions, to foster collaborative learning.

These varied interaction patterns not only promote active engagement but also provide opportunities for students to develop critical thinking skills, enhance their communication abilities, and learn from their peers. To ensure flexibility, teachers can also adjust pace and depth based on their students' comprehension and progress, so they provide supplementary explanations, offer additional activities for advanced learners, or provide more support for those who might be struggling. Teachers can also integrate technology such as digital tools, multimedia resources, and online platforms to supplement classroom activities

and encourage (inter)-(in)dependent learning. Therefore, students experience online and physical learning spaces where they find adapt to the environment more readily while teachers manage to accommodate student learning.

6.2 Flexibility in blended learning

Flexibility in blended learning refers to how teachers can adapt and ensure versatile instructional processes by combining both F2F and online learning components. This approach allows them to address and accommodate different learning preferences, needs, interests, and learning pace of students. They employ a range of modalities such as F2F instruction, online modules, multimedia resources, virtual discussions, and interactive activities to create a diverse learning experience. The online tools that are used to deliver the courses might include video, videoconference, team management tools such as YouTube, learning management systems, ZOOM, TEAMS, the activities presented in multiple modalities (synchronous & asynchronous, individual & collaborative, or interactive & experiential), course content delivered in multiple modalities through multiple media (text, audio, video, or visual) depending on their individual needs and preferences. In addition to that, there are several types of media and digitally functional features that need to align with the flexible course designs. These include accessibility guidelines which provide captions, transcripts for videos or audios, alt text for images, formatting that makes written texts accessible for all. Teachers provide flexibility to students, allowing them to engage with the modalities that best accommodate their learning preferences and enabling a more personalized learning process.

The multimodal possibilities in blended learning also offer flexibility in terms of time and pace. Students have continuous access to learning materials and can complete assignments at their own speed, thereby utilizing their time more efficiently. Blended learning enables teachers to provide feedback in multiple modes (written, verbal, and interactive) and through various modalities (F2F, online, synchronous, or asynchronous) to maximize flexibility and meet the diverse needs of learners. Teachers can also conduct assessment practices in multiple environments, whether they are formative or summative, allowing for greater flexibility and adaptability in the evaluation process. In addition to the structure, the flexibility in assessment can be created in the variety of assignment types that can include not only exams but also critical essays, case studies, projects, and more. The flexibility underlying the nature of the assessments and assignments might include submitting a written document, a video, an audio, or a group project presented verbally in a video.

In the blended mode of delivery, again in-person and online course delivery is essential in that it helps students engage with the course content, materials, peers in a flexible and personalized way in which they choose to complete some of the tasks and assignments online with continuous access to the in-person teaching, which often referred to as F2F with the use of digital technologies. On the other hand, the blended mode can be regarded as a delivery method that emphasizes a harmonious combination of in-person and remote learning, ensuring a balanced allocation of time and utilizing both online and physical environments. In the former, the course design is created and developed as F2F, but students are given access to tasks, materials, and some other resources online which fosters prolonged engagement in supplementary and complementary tasks. While in hybrid learning online time and

engagement is allocated longer time, in blended learning, online time can be allocated as extra time for students to keep learning and engaging in the course materials.

There are also several studies that discuss the pedagogical benefits of the multimodal integration of different formats and materials such as video that students can be pre-exposed to for ensuring that they establish their basic essential knowledge before the class. For example, according to Coffey (2014), the learning ability of students advances as they engage in course videos and exchange written feedback with the teacher. Delozier and Rhodes (2016) also showed that videos could boost the cognitive processes in the practice of both conventional and flipped learning. Furthermore, Long et al. (2016) reported that the integration of pre-class videos in the FC led to a positive attitudinal impact on how students view learning. However, distinct from the positive findings of these studies, Jensen et al. (2018) more recently argued that video-based lectures in flipped classrooms had only a minor pedagogical advantage over interactive tutorials or textbook-style readings in overall student learning. While these findings emphasize the prominence of integrating different modalities and assessing how they support student learning in flipped classrooms, there is still room for improving the features, structures and processes and modalities of components and elements in this model to achieve inclusive and meaningful flexibility (Woodcock, et al, 2022).

6.3 Flexibility in online learning

Virtual learning or e-learning utilizes technologies, either synchronously or asynchronously, to facilitate the educational instructional process, whereas in online education, it is necessary for all participants to be connected simultaneously. Therefore, in a fully online mode of delivery, the entire instruction is delivered through online platforms and in digital environments through multiple digital media including the use of video conferencing and learning management systems. Students engage in the instruction, interaction and materials in these online designs while also being assessed online in various situations. Flexibility in such a delivery mode, is used to grant relatively more control over various aspects of their learning, also allowing them to customize their learning to accommodate their individual needs, and preferences in a versatile and adaptable learning environment. Like the flexibility in blended learning, online modality also provides spatial options for students to choose when and where they engage in their coursework, access learning materials, participate in discussions, and complete assignments at their own pace and convenience. They can also choose to study in their preferred modality including interactive modules, discussion forums, virtual simulations, and multimedia presentations. The flexible spaces can then encourage them to personalize their own learning through their own choices because most online platforms can have the ability to adapt to the students' choices with complex algorithms.

As is often highlighted in the literature, online learning environments increase the collaborative and interactive practices such as online discussions, group projects, for better connecting with peers and instructors through e.g., video conferences, chat platforms, or discussion boards. Such facilities foster and strengthen a sense of belonging to a supportive community and facilitates more meaningful interactions.

In all three learning spaces, the distinction between them may appear outdated. Therefore, we argue that higher education should embrace hybrid modalities to ensure the full participation,

inclusivity, and accessibility of diverse cohorts of students. Hybrid models combine F2F, online, and blended learning approaches, offering enriched learning experiences. By adopting hybrid models, the flexibility can be multiplied compared to each learning environment separately, while also incorporating the benefits and surpassing the advantages of each mode. Hybridity can also address the weaknesses found in each individual mode. As Beattie (2000) suggests, students should have the freedom to choose their preferred modalities if options for engagement and learning are provided.

While the FC was initially used as a component of the blended approach, it is now being implemented in various modes and modalities. In FC, there is more of an organic relationship between the online components and elements and the F2F classes. The FC creates an opportunity for the students to engage in the primary course materials before the class. This pre-exposure increases students' readiness for the in-class activities that could include discussion, collaboration for deeper comprehension and acquisition of the concepts and theoretical arguments as well as applying knowledge and demonstrating competences, which could be hard to understand without closer scrutiny in a social, cognitive engagement in the class environment. The organic connection of the pre-exposure to the in-class course time is evident in that students are held responsible for completing the course materials and assignment which are not repeated in the class time but discussed as an argumentation and clarification with students' active participation to deepen the meanings of knowledge they are supposed to learn. Table 1 summarizes these modalities in terms of their diverse features.

Aspect	F2F Learning	Blended Learning	Online Learning
Definition	Ability to adapt and accommodate diverse student needs and expectations within a traditional classroom setting	Combining F2F and online components to address different learning preferences and needs	Utilizing online platforms to deliver instruction and facilitate learning
Modality	In-person classroom setting	Combination of F2F and online components	Entirely online delivery
Interaction Patterns	Whole-class discussions, small group activities, one-on-one interactions, collaborative learning	Various modalities and environments for interaction	Online discussions, video conferences, chat platforms, discussion boards
Access and Availability	Limited to scheduled class times and physical location	Continuous access to learning materials and flexible completion of assignments	Anytime, anywhere access to learning materials and activities
Assessment	Diverse ways of assessing student learning	Assessment practices in multiple modes and environments	Online assessments and evaluations

Technology Integration	digital tools, multimedia resources, online platforms are resources for support	Functions as context for online tools and learning management systems	Functions as context for online platforms and digital media
Flexibility Options	Tailoring instruction, varying grouping criteria, adjusting pace and depth	Adapting instructional processes, providing continuous access to materials and assignments	Customizing learning experiences, choosing preferred modalities, flexible completion of assignments
Hybrid Modality	Organic relationship between online components and F2F classes, pre-exposure to course materials	Combination of online and in-person learning experiences	Embracing the benefits and flexibility of both F2F and online learning environments
Benefits	Hands-on and experiential learning, active engagement, critical thinking skills, communication abilities	Personalized learning, versatile instructional processes, diverse learning experiences	Customized learning, flexibility of time and space, interactive and collaborative practices
Challenges	Limited flexibility in time and location, reliance on physical resources	Integration and coordination of F2F and online components, technological requirements	Self-regulation and time management skills, potential for reduced social interaction and support

Table 3: Flexibility in course designs

7 EMERGING FLEXIBLE MODALITIES

Flexibility in nature means that learning often takes place at the learners' own pace, regardless of their geographical locations, and materials can be accessed any time, and these are reported as perceived benefits or key enablers compared with lecture mode (Gardner, et al., 2016). In addition to the long-standing predominant modality of F2F courses where delivery students meet in a traditional classroom for instruction.

Several other modalities have been designed, proposed, implemented, and developed since the introduction of several technologies that make online delivery of participation possible. These modalities were of combined designs where F2F and online facilities are strategically merged to address the contextual and pedagogical needs. Table 4 summarizes the teaching modes with her corresponding descriptions and key characteristics.

Teaching Mode	Description	Key Characteristics
F2F	Traditional classroom-based instruction where students meet in person for learning activities.	- In-person interaction between students and instructors.
Blended Learning	Combination of F2F and online learning, where online materials and activities supplement in-person instruction.	- Flexibility in accessing materials online. - Combination of in-person and online interactions.
Blended/hybrid Synchronous Learning	Instruction delivered simultaneously online and F2F, without asynchronous elements.	- Real-time interaction through online and in-person channels. - Flexibility in accessing materials and participating in activities
Here-or-There Instruction	Modality catering to the needs of physically present and online/remote students separately.	- Differentiated instruction for in-person and online learners.
Blended/Hybrid Learning	Online learning supplements F2F instruction, typically with online components constituting about 50% of class time.	- Online materials complement in-person classes. - Balanced use of online and in-person instruction.
Hyflex	Students choose from three alternative delivery modes: online or in-person, synchronous or asynchronous.	- Flexibility for students to choose their preferred mode of participation.
E-Learning	Fully online modality without F2F instruction or scheduled class time.	- Instruction and activities delivered online.
Synchromodal Instruction	Online and F2F students brought together during synchronous class time.	- Real-time interaction between online and in-person participants.
Synchronous Hybrid	Onsite and remote students simultaneously attend learning activities during synchronous sessions.	- Real-time participation of in-person and online students.
Flipped Learning	Instructional content, activities, and feedback delivered online before class, allowing students to engage with materials at their own pace and utilize class time for interactive activities and discussions.	- Pre-class exposure to course content through online materials. - Class time dedicated to interactive and hands-on activities.

Online Flipped Learning	Online courses or cyber flipped courses where flipped learning is implemented online.	- Flipped learning approach delivered entirely online.

Table 4: Flexible modalities

As summarised in table 4, one modality is the blending of F2F and online learning (Boelens et al., 2017), which is often used synonymously with hybrid learning. Another is blended synchronous learning environment where instruction is delivered online and F2F simultaneously (Wang et al., 2017) without elements of asynchronous online mode, which can also be seen as hybrid learning. There is also blended synchronous mode where asynchronous and synchronous online learning modalities are delivered in combination with additional combined F2F elements (Lakhal et al., 2021). Here-or-there instruction on the other hand is another modality with a specific emphasis on the needs of the physically present students in the classroom (here) or online or remote students (there) (Raes, 2022). Towards the end of the continuum where flexibility is even more dominant, there is hybrid modality where online learning is designed to supplement F2F learning, typically keeping online components to about 50% of class time (Calafiore and Giudici, 2021). In Hyflex modality on the other hand, students choose from among three alternative modes of delivery according to their preferences. So students decide to attend the courses online or in person, synchronous or asynchronous (Beatty, 2019; Calafiore and Giudici, 2021).

On the contrary, e-learning is an online modality that does not require F2F instruction or scheduled class time. Instead, it involves the delivery of classroom activities online, either synchronously or asynchronously. There is also synchromodal instruction where online and F2F students are brought together during synchronous class time (Lakhal et al., 2021). In synchronous hybrid, on the other hand, onsite and remote students can simultaneously attend learning activities which is also described as synchronous learning in diverse environments (Raes, 2022).

Flipped learning as another modality that could support flexible learning has been gaining traction in higher education since it challenges the traditional classroom models by delivering instructional content online before class, which students can access at their own pace and convenience. This approach allows students to engage with the course material before coming to class, which can help to deepen their understanding of the subject matter and to use class time not only for interactive, hands-on activities, but also for understanding complex knowledge with the support of interactional and supportive discussions with peers and teachers. The fundamental design feature is to expose students to the course content beforehand to stimulate their thinking about the scope and extent of the topic of the course, and to prolong their thinking time, which can lead to more participatory practices. However, pre-class express can sometimes be problematic in terms of time pressure, so designing the flipped learning process inclusive (accessible to all students), engaging (dynamic interactional patterns that keep them active), and authentic (meaningful and relevant to the students) is crucial (Woodcock, et al, 2022). There are some basic considerations that educators need to keep in mind while developing a flipped learning design.

Online flipped learning is referred to as online courses, cyber flipped courses, or online to offline (O2O) mode of instruction (Zheng, Chu, Wu, & Gou, 2018). Such a model has been shown to have various effects on student learning, engagement, attention, and perceptions about instruction (Tang et al., 2023). While traditional flipped learning has been found to improve student learning, performance, and achievement in various courses (Romero-García et al., 2018), insignificant differences in learning have been reported in the context of business administration, engineering, calculus, pharmaceutics, and public health education (Findlay-Thompson & Mombourquette, 2014). However, Maycock (2019) reported that the traditional instruction group outperformed the traditional flipped learning group in the final exam. Stöhr et al. (2020), on the other hand, found that the online FC in applied physics for master and doctoral students led to a significantly larger gap in performance. Some learners may tend to perform better, while others may struggle even more due to the nature of online learning.

Online flipped learning has also been found to have an impact on students' affective variables, with increased satisfaction reported in curricular design, microeconomics, and algebra courses (Romero-García et al., 2018). However, nursing and engineering students expressed dissatisfaction with the flipped learning approach (Missildine et al., 2013). Business students were also found to be undecided about the approach (Findlay-Thompson & Mombourquette, 2014), while participants in flipped learning reported feeling a heavy workload due to pre-class preparation and in-class tasks (Enfield, 2013). Mechanical engineering students expressed frustration with the course structure in traditional flipped learning, and many indicated they were overwhelmed with the number of resources available (Mason et al., 2013). Moreover, Zappe et al. (2009) reported that 95% of undergraduate engineering students indicated that the flipped learning approach should be used 50% of the time or less, and traditional lectures should be maintained.

One consideration is to clarify the key learning objectives for each flipped activity before class and explain their relevance which helps students understand what they are supposed to learn and why it is important. Using and embedding videos, animations, quizzes, and other multimedia elements aligned with the objectives could enhance engagement and learning. Using authentic examples could increase the levels of preexposure to the content thanks to the practicality and relevance students might find useful. In flipped designs, there is a lack of collaboration and discussion aspects, which can be strengthened and organized around synchronous and asynchronous discussion forums or simultaneous collaborative writing or students' live meetings before the class time. Pre-course engagement and exposure to the materials can be made more social to keep students as a community where they can access or provide help. Such interactive tasks can also include group work, problem-solving activities, simulations, and other hands-on activities that require active participation. Providing feedback in multiple ways and in multiple modalities, such as video, audio, or written text-based feedback, as well as via other interactive ways, could be the last consideration. This feedback will help students to understand what they are doing well and where they need to improve. Therefore, flipped learning is a promising approach that can help students to deepen their understanding of the course material, engage with the course material at their own pace, and collaborate with their peers and teachers in a more interactive and supportive environment.

8 FLEXIBLE LEARNING AND TEACHING

8.1 How to facilitate learning.

When exploring flexible learning and teaching, it is crucial to emphasize the content and methods of student learning. As stated by Gordon (2014), in flexible learning and teaching, students can choose the course components they will engage with and the order in which they will learn the course content. They self-regulate the process based on their preferred pathways of learning, format of the materials, and the amount of study time required. This might include a self-inquiry, self-determination, and regulation process by which students could select topics of interest and use their strengths while learning.

8.2 How to adopt flexibility through AI.

Course delivery adopting flexible learning grants learners the liberty of selecting how and where they access learning materials which can take place in campus, on the web, or at both, which might employ various technologies including Augmented Reality. Offering self-paced learning opportunities supplemented by activities online that involve webinars by teachers, group discussions, online task engagement and automatic and tutor-led feedback could strengthen the flexibility on to customized learning procedures self-regulated and organized by students. With recent advancement in AI (Artificial Intelligence) we observe massive transformative changes in education, including how students can personalize their learning within the framework of flexible course delivery. By making use of AI students can create ad self-regulate customized learning content and experiences based on their individual needs and preferences. On the other hand, as students use AI, its algorithms can offer them personalized suggestions for learning resources, which can enhance the level of customization of the learning processes, allowing students to self-regulate and organize their learning process in a more flexible way. In addition to the increased personalization and self-regulation of learning, AI-powered tools can also facilitate automatic feedback and provide intelligent tutoring as students shape their experiences of learning. We also argue that these advancements in AI have the potential to transform and empower higher education with the opportunities for flexibility and personalization in flexible teaching and learning environments.

8.3 Didactic strategies for organizing learning activities.

A number of didactic strategies can be used to offer learners choices, such as lectures with seminars, autonomous learning, debate, colloquium groups, discussions, student-led exploratory practices, and gamification (Gordon, 2014). To afford flexibility in learning, teachers could provide students numerous strategies for effective learning, for example independently, collectively, or collaboratively (Lundin, 1999). Therefore, in the context of the FC, it is of utmost importance to provide opportunities for autonomous, active, and collaborative learning.

8.4 What types of learning resources should be provided to students?

A wide range of learning and teaching resources can be provided for students which can mediate and facilitate the process of engagement in the flexible learning. These resources can

be motivated by different sources, such as content created by instructor or learner, or resources that can be selected from the web (Collis, 2004). Different digital media formats, such as recordings, podcasts, narrated screen captures, or lecture videos, can bolster flexibility in that they offer information in diverse modalities (Gordon, 2014). Open Educational Resources (OER) can also strengthen flexibility in that they are allowed to be used openly and can be customized to appropriate in specific contexts according to the needs and preferences of students.

8.5 When and how to provide assessment and evaluation.

Assessment and evaluation of learning can be made flexible in various ways by employing various assessment methods, such as preparing presentations, submitting research papers, engaging in team projects, doing peer assessments, and completing adaptive tests, or even constructing an E-portfolio. Students can also be provided with real-time assessments, such as assessment reports or instant feedback, using AI-powered learning analytics in interactive dashboards. These AI practices enable students to track their progress, identify areas for improvement, and receive immediate guidance and support for their learning journey. These methods can offer a high degree of flexibility for students who can demonstrate their performance of the learning in more creative ways (Casey, 2005; Gordon, 2014).

In addition, personalized support could augment student engagement and boost their motivation. In recent years, intelligent learning systems, including adaptive learning platforms or chatbots, can provide automatic instant tailored support for learners according to their features of learning, their achievement level, preferences for learning, and interests in diverse topics (Chen & Zhu, 2019). Support for flexible learning can also be ensured through allowing students to select the language of the learning materials or communication in the digital environment, which could quite be equipment for the international environment where students might have low proficiency of the medium of instruction particularly relevant for international students. To design a flexible process of learning in flipped, blended, and hybrid learning, we could and should ensure:

- accessibility means that materials offered to students to support their learning are accessible online by, for example, making them available on Canvas, Blackboard, Moodle, and Google Classroom.
- multi-modality means materials and activities are offered in different modalities: both online and offline. These might also include assigning group work online and/or onsite, while discussions in both.
- support and feedback system through establishing and managing discussion boards, active email exchanges, or flexible office hours (online or onsite)

9 FLIPPED LEARNING AS A FLEXIBLE DESIGN

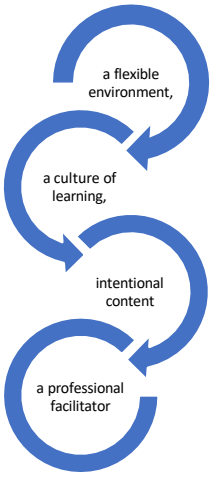
The model has gained gradually a legitimate position across diverse educational organizations and disciplines many of which recounted various benefits including lesser rate of failure, a greater level of flexibility in the design and the delivery of the courses, more positive attitudes by students, and higher test scores (Mok, 2014) as well as potential increase in overall academic performance .The process of designing a FC appears to grant room, i.e. flexible

spaces, for additional activities for active learning during class time, such as improved mentoring relationship between the teacher and student, more advanced forms of collaboration among students, the tendency to engage in cross-disciplinary topics and learning, and the redefinition of engaging in the traditional lectures with a new mindset for learning (Röhl, Reddy, & Shannon, 2013). Constructing and integrating flexibility into flipped classrooms involves utilizing in-class time for active discussion, collaboration, reanalysis, argumentation as learning versus the transmissive lecture controlled and delivered only by teachers (Röhl, Reddy, & Shannon, 2013).

'Flipped model also allows for turning the class time into more active and meaningful student engagement thus making learning a reciprocal and mutual process co-led by teachers and students (Jakobsen & Knetemann, 2017), This reorganization of the learning and teaching requires flipping typical teaching and learning activities into those that are aligned with new pedagogical contexts and objectives through flipped model (Günbatar, 2021). While individual teachers can design and implement FC themselves according to their own particular needs, effective operation of flipped classrooms necessitates an all-inclusive organizational planning which comprises prolonged improvement by a support team of IT experts and digital learning designers (Sankey & Hunt, 2013).

In the flipped learning model, students are encouraged to engage with and learn from the material before attending the physical classroom, which adds to the flexibility provided for students. This pre-synchronous course exposure can be achieved through different methods, such as video lectures delivered asynchronously by the course instructor, outsourced relevant materials from YouTube, or even presented as an audio podcast when appropriate for audio-based engagement with students. The pedagogical features of flipped classrooms include providing students with relevant instructional materials prior to the lesson and using active learning strategies in the classroom, where students are encouraged to think critically, engage in problem solving, and participate in decision-making. These practices, including pre-course engagement, create a flexible environment, which aligns with the four pillars of flexible learning as identified by Bergmann and Sams (2012). These pillars which are inherent in the pedagogical architecture of flipped classrooms might involve:

Figure 2: The four pillars of flexible learning



For instance, to create a supportive environment and provide relevant facilities, flexibility in the physical learning environment should accommodate both group and individual work by creating multiple spaces for learning, and students should be at the centre of the course design, embracing learner-centeredness. These two pillars are built into the pre-course engagement of flipped learning, where individual or group collaboration is encouraged. The third pillar emphasizes intentional content that fosters students' conceptual and procedural fluency, which is achieved by allowing students to study at their own pace and engage with the content before class, without any restrictions. This is facilitated through the pre-exposure design, where students are given ample time and access to study the topic at their own time and pace.

The fourth pillar emphasizes the need for a professional educator who can serve as a facilitator and engage students in meaningful and critical learning through pre-exposure and in-class discussions and argumentation of concepts and theoretical knowledge in creative ways. In flipped classrooms, teachers reposition themselves as facilitators by creating room for students to study beforehand and strategically managing discussions in the classroom, whether online or onsite, to encourage students to think critically and engage in dialogue. The pedagogical roles are swapped, with learners actively seeking ways to learn and relying on teachers to address knowledge gaps and promote perspective development during synchronous dialogical activities. The flipped learning model promotes a learner-centric approach, utilizing pre-course engagement, intentional content, and active learning strategies in the classroom, while redefining the role of teachers as facilitators in the learning process. This approach fosters student engagement, critical thinking, and conceptual fluency, creating a flexible and dynamic learning environment.

10 Research Findings

10.1 Students' perceptions on effectiveness of FC

Academic research into student perceptions and the effectiveness of a FC is relatively limited at present, with most of the commentary coming in the form of informal weblogs and the like. Bishop and Verleger (2013) provide a recent survey of research into the FC approach and report on eleven studies that have investigated student perceptions of the flipped classroom, with results being relatively consistent in that general student opinion of the FC tends to be positive, with a significant minority being opposed. Lage et al. (2000), in introducing the term "inverted classroom", find favourable impressions from students to the introduction of such a model in an introductory microeconomics course. Gannod et al. (2008) find that students in a software engineering course were largely happy with the model, although there were students who were not so supportive.

As for students' perspectives of flipped learning, Findlay-Thompson & Mombourquette (2014) found that student views of flipped learning were varied and that academic outcomes were not significantly different between flipped and traditional classrooms. Han and Klein (2019) argued that learning modalities exposed to before class including reading resources or video-streamed lectures are generally employed in flipped classrooms. The authors propose that

many students prefer pre-class assignments to be short, clearly objectivized, and carefully guided so if teachers want to create flexibility in their flipped classrooms, they need to develop a clear guidance and short assignments which could lead to more response and engagement by students. The FC is also found effective in improving academic performance, motivation, and self-regulation in higher education (Chang et al., 2020). Students also prefer the FC over traditional approaches because it provides flexible-paced learning.
(Alghasab, 2020).

Bates and Galloway (2012) conducted a study in a first-year physics course and found that 80% of survey respondents preferred the FC approach to a traditional lecture-based approach. This result suggests that the FC approach may be more effective in physics classes than traditional lecture-based teaching. Schullery et al. (2011), on the other hand, found that 32% of survey respondents in a flipped introductory business course preferred a return to traditional lecture-based teaching. Despite this, many students had a positive response to the Approach, indicating that the approach may be effective in business courses. However, Strayer (2012) found that students in a flipped introductory statistics course were less satisfied with the classroom structure than those in a traditional lecture-based class.

However, as the semester progressed, students became more open to cooperation and innovation, indicating that the FC approach may have long-term benefits. Furthermore, Jaster (2013) found that most students preferred traditional lecture-based teaching over the FC approach in a first-year algebra course. This result suggests that the FC approach may not be effective in all disciplines.

10.2 Teachers' perceptions on effectiveness of FC

There are studies in which instructors using the FC instructional design have testified their constructive insights and practices. For example, Hall & DuFrene (2016) reported that best practices for initiating and implementing a FC requires giving clear instructions, engaging learners in dynamic learning activities, and offering the support they might need when they engage in flipped activities such as pedagogical problem-solving and in-class discussion.

As has been highlighted in many studies, the approach adopted in FC allows for active learning through the meaningful use of learning technologies, multimedia, and a pedagogical strategy involving converting the traditional classroom activities into those that student can complete outside the classroom or vice versa (Uzunboylu & Karagozlu, 2015). Through flipped classrooms, one can also invert the process of learning into an inclusive and engaging one which could contribute to closing the gap that might be caused by the diverse background of the students and the leveraging the amount of the time that they need to spend and stay active (Lage et al., 2000). Another area of benefit can be found in the redesigning of traditional typical lectures as flipped teaching which led students to developing a sense of deeper learning and of readiness for the assessment and evaluation where the flipped learning and in-class teaching functioned as complementary and allowed for personalized feedback (Mason & Gayton, 2022). The authors also highlight the emerging opportunities students can learn through by elaborating on and addressing issues related to a FC setting (Mason & Gayton, 2022). The flipped learning design also activates and nurtures specific language skills such as speaking and writing as students engage in speaking and writing as productive skills as part of

active and dynamic participation in courses (Turan &Akdag-Cimen, 2020). Given the research findings above, while the flipped learning model proves to be a potentially applicable pedagogical design and practice, there is still a need for further research to fully reveal further benefits and potential limitations.

On the other hand, online FC reports show both positive and negative results. Positive results include self-directed learning, maintenance of students' perceptions and performance in comparison to F2F learning, an increase in average grades obtained in hybrid FC, and an increase in student engagement (Domínguez-Torres et al., 2021). However, some negative results include dissatisfaction among students, even if their learning, attention, and evaluation improved (Tang et al., 2023), emphasizing the need for efficient use of technologies in online flipped learning (Lin et al., 2019). Recent use of FC during emergency online learning demonstrated that FC adapts fairly well to the online mode, increasing student engagement and performance (Campillo-Ferrer & Miralles-Martínez, 2021; Gopalan et al., 2022; Jia et al., 2022; Latorre-Cosculluela et al., 2021 as cited in Fructuoso et al., 2022). In engineering degrees, results show a positive impact on learning processes and student acceptance in online FC. In education degrees, the flipped model has proven to be effective in online education for student learning, performance, and motivation and in relation to the quality and variety of didactic resources provided (Collado-Valero et al., 2021).

10.3 Benefits and challenges

The literature reveals that empirical studies have reported mixed findings regarding the benefits and challenges of the FC(FC) model. Some researchers have reported several benefits of using the FC model. Hung (2015) reported that using WebQuest provided an active learning environment that increased the involvement and participation of students. Turan and Akdag-Cimen (2020) found that the FC promoted two key aspects of learners' autonomy and student-centred learning, both of which enhanced learner engagement. In addition, lower-level thinking skills can be enhanced by self-paced materials in contrast to higher-level cognitive processes, which can be developed in class (Yang et al., 2018). Engin (2014) also found that students are more likely to become experts and develop higher-order cognitive skills through the FC model. Moreover, some researchers have found an increase in the motivation, engagement, and satisfaction of students in response to prior preparation, helping to reduce anxiety (Abdullah et al., 2019). Haghnighi et al. (2018) reported that the FC model provides students with additional opportunities to engage in meaningful interaction, particularly in comparison to the conventional classroom, in which 90% of the time is taken up by the delivery of a lecture, with only 10% being dedicated to the communicative use of speech acts. However, the literature also reports challenges associated with the FC model. Some researchers have reported dissatisfaction among students, even if their learning, attention, and evaluation improved (Tang et al., 2023). Lin et al. (2019) emphasized the need for efficient use of technologies in online flipped learning. Nonetheless, the recent use of the FC model during emergency-online learning has demonstrated that it adapts fairly well to the online mode, increasing student engagement and performance (Campillo-Ferrer & Miralles-Martínez, 2021). In engineering degrees, results show a positive impact on learning processes and student acceptance in online FC (Polanco & Moré, 2020), even if further research on effective FC in distance education is needed (Nahar & Chowdhury, 2019). In education degrees, the FC model has proven to be effective in online education for student learning, performance, and

motivation and in relation to the quality and variety of didactic resources provided (Collado-Valero et al., 2021).

Self-paced materials, as highlighted by Yang et al.(2018), are more effective in enhancing lower-level thinking, whereas higher-order cognitive skills are developed in class. Engin (2014) demonstrates that the FC facilitates higher-order cognitive skill development. In addition, prior preparation helps to reduce student anxiety and increase motivation and satisfaction (Huynh & Nguyen, 2019). Similarly, Haghnighi et al. (2018) suggest that the FC offers more opportunities for meaningful interaction than the conventional classroom.

Abuhmaid and Abood (2020) found that the procrastination of students persisted in online flipped learning, and despite positive student attitudes, there were no significant differences for the benefit of the approach. Smith (2015) suggested that flipping a teacher-training course may create an opportunity for teacher candidates to observe and experience the approach first-hand and deepen their understanding of the course content. Lin et al. (2019) also emphasized the importance of appropriate implementation of instructional strategies, software, and technologies in creating an online learning community, rather than solely adopting technologies into instruction. The FC approach has been found to be effective in improving student engagement, motivation, and learning outcomes (Baker, 2016). By providing students with the opportunity to apply their knowledge in real-world scenarios and work collaboratively with their peers, the FC approach can enhance the development of critical thinking, problem-solving, and communication skills (Butt, 2014). Conversely, under a traditional didactic lecture structure this active student engagement is left to a single one-hour tutorial each week, and then outside the classroom to individual study and/or informal study groups. To students, the syllabus and teaching material in a FC may not look particularly different to more traditional approaches, but the form of accessing the syllabus and teaching material is different. As such, a FC could be seen as a stepping stone to less structured and inquiry-based learning environments such as problem-based learning (see Hmelo-Silver, 2004).

As for the challenges, Homma (2015) highlights that initial resistance may arise in response to abrupt changes in teaching methods. Webb, Doman, and Pusey (2014) found that intermediate Chinese EFL students and teachers gradually developed positive attitudes towards the flipped classroom, following initial implementation. However, a number of other studies have found that only a small percentage of students view the videos prior to the lesson (Watanabe, 2014), and many express concerns about the additional workload, technology issues, and anxiety related to writing (Turan and Akdag-Cimen, 2020). Engin (2014) reports that students often find the videos unclear and prefer the teacher-fronted classroom. Students also expressed a desire for more online instruction to supplement classroom materials (Haghighi et al., 2018). Webb, Doman, and Pusey (2014) note that teachers tend to have negative attitudes towards the flipped classroom, although these attitudes can improve over time. The lack of research into the advantages and challenges of the FC in the EFL context, particularly in Arab countries, remains a concern (Turan and Akdag-Cimen, 2020).

11 PRACTICAL SUGGESTIONS FOR FLEXIBLE DESIGN IN FC

To create a flexible design in flipped learning, it is essential to provide learners with a variety of

options for accessing and engaging with the course content. For instance, providing multiple formats such as video lectures, audio recordings, and written materials can cater to learners' different learning styles and preferences (Bergmann & Sams, 2012). Moreover, integrating interactive elements such as quizzes and discussion forums into the online materials can enhance learner engagement and promote active learning (Talbert, 2017). Considering these main elements, the following practical suggestions can be made to promote flexible learning experiences:

Use a variety of didactic strategies:
To support diverse learning needs and preferences, educators should incorporate a range of modalities, such as video lectures, interactive activities, and peer-to-peer discussions (Bonk & Khoo, 2014). By providing multiple ways to engage with content, learners can choose the modalities that best suit their learning style. Furthermore, we could

- Provide flexibility in scheduling and deadlines through a range of due dates or allowing students to complete assignments at their own pace.
- Provide students with different options for demonstrating their knowledge and understanding, which might entail requiring students to submit alternative assignments such as a video presentation, a podcast, or a poster presentation.
- Provide regular feedback on assignments and progress can help students identify areas of strength and weakness and adjust their learning strategies accordingly.
- Offer various types of assessment methods that cater to diverse learners' needs, which can include traditional exams, projects, essays, presentations, and more.

Foster collaboration and interaction:
Flipped, blended, and hybrid learning environments provide opportunities for learners to collaborate and interact with their peers and instructors (Bishop & Verleger, 2013). To promote collaboration and interaction, educators should design activities that encourage learners to work together, such as group projects, peer reviews, and online discussions. More specifically we could

- Incorporate opportunities for collaboration and feedback can also make learning designs more flexible.
- Encourage students to working with peers and learn from one another in order to gain new perspectives.
- Facilitate the process of building meaningful social and communication skills among students to enable knowledge flow and mobility among them.

Provide opportunities for reflection:
Reflection is an essential component of learning and helps learners make meaning of their experiences (Schön, 1983). To promote reflection, educators should design activities that encourage learners to reflect on their learning, such as journaling, self-assessment, and peer feedback (Moon, 2013). In practice, we could

- Allow students to participate in learning activities at times that work best for them and keep reflecting on their engagement and progress with peers.
- Provide opportunities for live interactions and discussions with peers and educators to ensure there is continuous critical self-reflection.

- Design online/F2F, synchronous/asynchronous, individual /collaborative, written/verbal spaces for reflecting on their process of learning.

Incorporate technology effectively:
Technology plays a critical role in flipped, blended, and hybrid learning environments such as communities of practice (Garrison & Vaughan, 2008). Educators should select technologies that align with their learning goals and use them to facilitate learning experiences that are engaging, interactive, and accessible (Bower et al., 2015). These can be embodied through integrating written materials, videos, podcasts, interactive activities, and simulations to engage with. In further practice, we could

- Provide and incorporate multiple media and ways to access and engage with the learning content.
- Use a mix of synchronous (live) and asynchronous (self-paced) delivery methods to ensure inclusive participation and engagement for diverse students.
- Practise diverse technology tools that promote active ownership of the learning process by creating independent and collaborative working patterns.
- Ensure that students find their own way of engaging in materials and in the process of learning to support their autonomous learning.

12 Implications and considerations

12.1 Taking control of the learning experience through agency.

Flexible learning empowers students to take control of their own learning experience, using a range of practices and principles that cater to individual learning styles and preferences (Shemshack, et al., 2021). From a flipped learning perspective, flexibility means collective adaptability, allowing learners to choose the mode of study that best suits their needs, whether it be synchronous or asynchronous, individual, group, or paired (see Creely & Lyons, 2022)). Hybrid and ubiquitous learning also offer flexibility in terms of time and location. To promote self-directed learning, a personalized approach to tasks is used, enabling learners to decide on the mode of interaction pattern that best suits them (see Noguera, et.al., 2023).

In addition, flexible learning could employ multimodal resources, providing students with access to diverse forms of content supported by multimodal and multi-dimensional scaffolding (Al Mamun, Lawrie, & Wright, 2020) to build upon their existing knowledge and skills, which accommodate their specific learning needs and preferences. Teaching flexibility is equally important, requiring negotiation between teachers and students to ensure that the principles of flexibility are clearly understood and followed. To achieve this, teachers can design the syllabus with flexibility in mind and engage students in a process of negotiation for clarifying and leveraging the content and process to be adopted during the course. By encouraging flexible practices of engagement, feedback, assessment, and evaluation, students can exercise their agency and make informed choices, developing a sense of control over their learning. This creates a safe environment for them to cultivate positive attitudes towards learning, ultimately resulting in a more enjoyable and effective learning experience.

12.2 Overcoming Institutional Barriers to Flexible Learning

Despite the advantages of flexible learning, implementing it can be challenging due to institutional barriers that may require a re-evaluation of traditional delivery and participation methods. To ensure successful adoption, both teachers and students must be trained in flexibility methods and comfortable with interactive and collaborative learning modes (See Lei & Medwell, 2021). Careful planning is also necessary to avoid causing anxiety or insecurity. A sense of control must be established, and inclusive flexibility should be taken into consideration (Benade, 2019) to ensure that special needs students are not at a disadvantage. From a flipped learning perspective, flexibility can be incorporated into program designs through synchronous and asynchronous modalities, adaptive practices, and hybrid forms that enable ubiquitous learning anytime, anywhere (See Rof, Bikfalvi, & Marques, 2022). However, institutional rules may hinder participation and delivery of flexible modalities, creating potential barriers (Malik et al., 2023). Negotiation and discussion with students can help develop a syllabus design and learner contract that allow for flexibility. Furthermore, institutional support may be needed to help students schedule their learning pace, thus reducing stress and promoting a healthier work-life balance.

12.3 Balancing Spontaneous and Planned Flexibility

Flexibility in education can be both spontaneous and planned, with a balance needed to avoid creating a sense of over-flexibility and anxiety. To address this, principles of flexibility should be followed, and flexibility methods should be taught to both teachers and students. Teachers can create spontaneous flexibility to overcome contextual challenges and support students' learning flow (Ismayilova & Bolander Laksov, 2022), while planned flexibility can include syllabus with a flexible weekly schedule that allows students to choose the mode of participation and course delivery in advance (See Bockorny et al., 2023). However, flexibility and self-regulation in distance learning can cause dissatisfaction and disengagement, with a moderate risk of burnout (Brandau, Vogt, & Garey, 2022), likely to lead to low attendance and course completion rates. In the context of flipped learning, teachers and students can use virtual or onsite presence and interactive or collaborative working modes to promote flexibility (See Bülow, 2022). It is important to note that flexibility may not work for all students, especially those with special needs (See Parmigiani et al., 2021). Therefore, inclusivity should be a crucial aspect of flexibility in education. Teachers should create an environment that supports and encourages inclusive practices, including accommodating students' unique learning needs and providing necessary resources and support. By balancing both spontaneous and planned flexibility while keeping inclusivity in mind, educators can create a more effective and engaging learning environment for all students (See Rapanta et al., 2020).

12.4 Designing Flexible Learning for Students with Special Needs

Flexible and adaptive learning design can be particularly beneficial for students with special needs, including those who are blind, have social anxiety, hyperactivity, dyslexia, learning disabilities, or are on the autistic spectrum (See Yenduri, et al., 2023). Through personalized approaches to tasks and adaptive pathways, flexible learning can help students with special needs engage with course materials and learning activities more effectively. In the context of flipped learning, flexibility can be implemented in a variety of ways. Providing

a range of interaction patterns that allow students to engage with course content in ways that suit their individual needs, such as group work, individual study, or paired activities, can also be helpful.

For visually impaired students, videos can be accompanied by audio descriptions or text descriptions, as well as tactile materials to provide hands-on learning experiences (Harjoe, 2023). For students with social anxiety, asynchronous learning options can be offered to reduce the stress of live sessions (see Fernandez et al., 2022), and smaller group work with clear guidelines could be arranged to make participation less overwhelming. For hyperactive students, short videos with interactive elements can help to prolong their attention, and short breaks can be provided (See Sújar, 2022). To support students with dyslexia or learning disabilities, captioning and transcriptions can be provided in videos, and font and color choices can be optimized for readability (See Hackl & Ermolina, 2019). For students on the autistic spectrum, clear guidelines and visual aids can be used to communicate course content and instructions (See Rutherford et al., 2020).

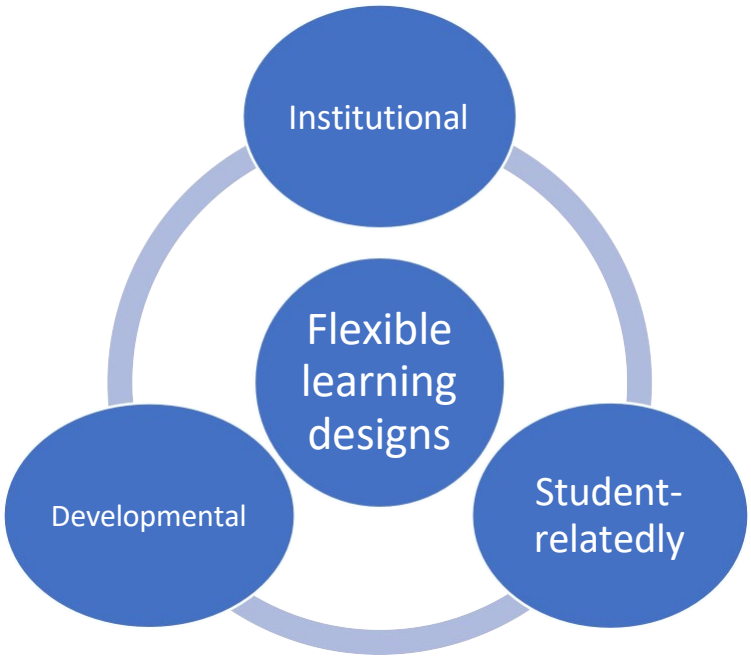
Group work can also be organized to allow for comfortable levels of interaction. Furthermore, pre-class tasks can be made available for longer periods to allow students with cognitive and physical impairments more time to engage (See Casselman et al., 2019) and complete tasks, and schedules for completing and submitting tasks, and assessments can be made more flexible to accommodate individual needs (See Goedhart, 2019). Clear instructions and predictable plans can also help to reduce anxiety for students on the autistic spectrum (See Saggers & Ashburner, 2019). We note that these strategies not only benefit students with special needs but also contribute to creating an inclusive and accessible learning environment for all students with flexibility in time periods, in assessment, in grouping students. We argue that we should provide a range of features and options that address the different needs and abilities of students, to make FC a more engaging, motivating, inspirational, and equitable approach to education.

13 CONCLUSIONS/REFLECTIONS

In conclusion, this conceptual framework for flexible learning design within the context of the FC provides a comprehensive understanding of the principles, strategies, and implications associated with flexibility in education. By exploring the dimensions of flexibility and the theories that underpin flexible learning design, this framework offers valuable insights into creating adaptable and student-centred learning environments. The framework highlights the importance of flexibility in various learning modalities, including F2F, blended, and online settings. It acknowledges the unique considerations and strategies required for each modality while emphasizing the potential benefits and challenges that arise with flexible approaches to promote the digital practices in the flipped classrooms. Moreover, it explores emerging flexible modalities, paving the way for innovative and dynamic learning experiences of pre-exposing students to relevant context which can prepare them to maximize their learning experience sin synchronous classes. The paper emphasizes the critical role of flexibility in both FC and recognizes the need to adapt instructional delivery, design learning activities, and provide diverse learning resources to accommodate individual student needs in various ways. The framework also addresses the significance of timely and appropriate assessment and evaluation methods within flexible learning environments. Within the framework, the concept

of the FC stands out as a promising approach to flexible design. By utilizing technology and pre-recorded content, the FC empowers students to engage in active learning during F2F sessions, promoting flexibility and personalization in their educational journey. The practical suggestions and strategies outlined in the report serve as a valuable resource for educators interested in implementing flexible design within the FC model. There are several conclusions we could draw based on the conceptual framework focusing on the challenges and opportunities that may be encountered. These can be categorised in three main themes which include institutional, student-related, and developmental as in figure 3. These themes are mutually and multi-directionally related.

Figure 3: Challenges and opportunities in flexible learning designs



13.1 Institutional

Institutions play a key role in initiating, developing, and sustaining flexible learning designs. Their long-term plan to position students in such designs requires ensuring continuous technological Infrastructure and developing a culture of flexible learning.

Supporting technological Infrastructure
The successful implementation of flexible learning design relies mostly on appropriate technological infrastructure which institutions need to ensure through creating accessible digital platforms, tools, and resources. So, institutions need to invest in robust IT systems, addressing connectivity issues, and offering technical support if they are to facilitate seamless and effective flexible learning experiences for their students.

Developing a culture of flexible learning
One of the key challenges in implementing flexible learning design in FC is overcoming institutional constraints. Some institutions often have already-founded educational structures and practices that could be hard to change. Implementing flexible learning in diverse pedagogical approaches including the FC requires re-evaluating policies, strengthening infrastructure, and ensuring institutional support for developing flexible structures and creating opportunities for innovation. Faculty support is also needed for ensuring a successful adoption of flexible learning practices, which is also strengthen by collaboration. They can share their best practices and provide ongoing support to boost confidence in delivering flexible learning experiences.

13.2 Student-relatedly

Flexible learning designs not only require teachers to understand flexibility and design flexible courses but also require students to be able to learn in such designs. Therefore, students' skills of self-regulated learning need to be strengthened, their diversity needs to be recognised and accommodated to be inclusive, personalized differentiated instruction can be maximized, through meaningful collaborative engagement designs where social interaction is enacted in multiple ways.

Boosting low self-regulation
Flexible learning design places greater responsibility on students for managing their learning. However, many students may lack the necessary self-regulation skills to effectively navigate flexible learning environments. To address this challenge, we could incorporate explicit instruction on self-regulation strategies, providing ongoing support, and promoting metacognitive awareness. Enhancing students' self-regulation competences not only benefits their learning in flexible settings but also prepares them for lifelong learning in diverse setting where flexibility is key features of the working style.

Accommodating learner diversity and inclusion
Flexible learning design offers opportunities to address learner diversity and promotes inclusion. We should seek ways of providing a range of options for content delivery, engagement, and assessment, and ensure flexibility can accommodate diverse learning needs, preferences, and abilities. It is also necessary to address potential inequities that may arise in access to technology, resources, and support. Designing inclusive flexible learning experiences in course designs requires considering diverse learners' perspectives, ensuring accessibility, and providing support for diverse student populations, which needs to be addressed through careful learner analysis.

Practicing personalization and differentiation
Flexible learning design gives students several opportunities for personalized learning and differentiated instruction, which allows them to engage with content at their own pace, explore diverse interests, and choose learning pathways aligned with their own learning goals. In addition, we as teachers and educators need to make careful planning and allocate resources to meet individual needs efficiently in a way that maximizes engagement and learning.

Promoting collaboration and social interaction
Collaborative learning and social interaction are important aspects of flexible learning because fostering meaningful collaboration and interaction among students can enable them to self-regulate the process of learning in a community of student. Such a design can be developed by employing synchronous and asynchronous communication tools, fostering virtual communities, and designing collaborative activities. The options for accessing assistance and co-creation in addition to the teacher support can help students develop a sense of affiliation and belonging which maximizes the positive outcomes of flexibility.

13.3 Developmental

Providing professional development
Teachers play a critical role in facilitating flexible learning designs. However, they may require additional professional support and education to effectively design, deliver, and assess learning experiences in flexible environments. Professional development programs can provide teachers with the necessary pedagogical strategies, technological skills, and instructional approaches customised for flexible learning. Providing adequate training opportunities enables teachers to adapt their practices and maximize the benefits of flexible learning and ensuring deeper and prolonged student engagement in learning.

Balancing time management and workload
Flexible learning design can also help students promote their ability to make careful time management and consider their workload. Therefore, teachers need to provide clear expectations, setting realistic deadlines, and promote effective time management strategies to them mitigate the potential overwhelming challenges. Flexible designs might overwhelm some students who seek certainty and structures, so we need to create a balance between structured and flexible design and minimize uncertain overly flexible aspects of our courses.

Conducting continuous assessment and feedback
Flexible learning design poses challenges in assessing and providing timely feedback to students since multiple mode preferences could require longer time for teachers to design the appropriate assessment and personalised feedback though using different formats. However, this is an essential aspect of flexible designs where traditional assessment methods may need to be adapted to accommodate flexible learning. This can be achieved by using and integrating formative assessment and alternative assessment strategies as well as leveraging technology to facilitate efficient feedback processes and delivery.

Ensuring continuous development
Flexible learning design is an iterative process that requires continuous development and assessment. We should develop instruments to elicit formative constructive feedback from students, faculty, and other stakeholders, and use such data to inform and refine their flexible learning practices and approaches. Such feedback can help us address potential challenges immediately and improve the effectiveness of flexibility. Regular formative assessment can help us identify areas for improvement and ensure that students are engaged with our flexibly design course and that learning takes place as intended in the learning objectives.

Maximising sustainability

Implementing flexible learning designs can pose challenges for ensuring sustainability because teachers and educators need to navigate and accommodate all students' flexible participation in the course, which could be a daunting task. Therefore, institutions should not only plan long-term resource allocation, infrastructure maintenance, but also ensure teachers' continued implementation of flexible learning initiatives. To ensure sustainability, institutions need also to develop professional development opportunities and provide diverse support systems for them to continue to practice and integrate flexible dimensions in their courses.

In summary, this conceptual framework serves as a valuable guide for teachers, educators, policymakers, and researchers seeking to promote flexible learning environments within the FC context. By embracing flexibility, educational institutions can adapt to the diverse needs of students, enhance engagement in learning, and promote meaningful learning experiences particularly within the context of the flipped classroom. Implementing the principles and strategies outlined in this framework will contribute to a more student-centered and dynamic educational landscape, empowering students not only to learn the course content in self-regulated manner and but also to develop their skills to learn in multiple ways in the flipped classroom.

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