

## Synthesis of effective strategies for and trends in flexible learning

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**Abstract:** *The paper discusses effective strategies for flexible learning and synthesizes recent trends in future education and training in computing. Both the strategies and trends are derived as a result of analysis of survey results, conducted for the European Thematic Network on Future Education and Training in Computing: How to support Learning at Any Time Anywhere (FETCH).*

### INTRODUCTION

Flexible learning is learner-centred enhanced and empowering experience [1, 2, 4]. Flexibility can be versatile, and includes time allowed for coverage of material, time required to complete coursework or assessments, flexible structure of the course content or flexible mode and type of delivery of the course material.

In this paper, we define flexible learning as broadly as possible so that we can test a range of hypothesis related to planning, delivery and assessment. Our definition of flexible learning includes the following:

*Planning, development and evaluation:* a key objective of the work in the *European Thematic Network on Future Education and Training in Computing: How to support Learning at Any Time Anywhere (FETCH)* is to find out how to best plan for flexible delivery so that we can ensure that the needs of flexible learners are met. In order to achieve the objective we studied **planning** for flexibility both from an individual and a group's perspective and aimed to identify trends in planning that ensure that individuals stay engaged and contribute.

In collaboration with FETCH partners, we designed constrained environment where engagement and commitment of learners can be tested, taking into account planning for flexibility. This was ensured by giving the learners non time specific tasks which they could attempt at anytime and anywhere.

*Location independence:* In the context of FETCH, flexible learning is both **location and time independent**; we cross geographical borders at any time.

*Individual and group access to alternative learning environment:* We surveyed FETCH partners with the objective to find trends promoting and ensuring flexibility. We targeted both **individual** learning styles and learning in **groups**, as we recognize that transferrable skills, such as working in teams need not be compromised by flexibility.

*Retention in flexible learning:* Retention has been recognized as a significant issue for flexible learners [2, 4, 5]. We aimed to assess the success of measures taken to ensure **participation** and **retention** of learners across partners in FETCH. We identified continuous but flexible participation as crucial for students' progress and retention.

*Structured, directed or independent learning:* We recognized that there is a varying need for **structure** and **direction**. We identified a dominant trend for flexible, yet, guided learning.

*Continuous multi-channel communication:* With the advances of technologies, improvement of security and provision of flexible yet accessible platform, across FETCH the delivery, assessment and even planning for computing related courses is achieved via a **multi-channel** environment. Flexibility also manifests itself in varied assessment activities which aim to appropriately target students with different learning needs.

*Adherence to national and international standards:* In the presence of flexibility **adherence to standards** of paramount importance. We looked for trends that ensure high quality of teaching that enables high quality learning delivered in a flexible way to the satisfaction of both students and employers.

We structure this paper in three parts. We first discuss predominant learning models. We next present good practices identified as a result of partner wide survey in FETCH. Finally, we synthesize discussions and align literature review with findings resulting from partners' engagement in the thematic network.

## MODELS FOR FLEXIBLE LEARNING

We are motivated by the strong belief that flexible learning empowers learners by, for example, making learning possible or affordable in circumstances where other approaches are not feasible. Flexible learning has been shown to lead to cost savings and faster delivery of materials, to leverage greater value from corporate ICT investments, and to make better use of learning opportunities already available on the web.

Flexible learning offers a highly learner-centred solution. It allows educators to exploit learners' enthusiasm for digital technologies and allows educators to be adaptable and responsive to change, through speed of publishing and updating [5].

We consider the following models for flexible learning that are present in FETCH.

- Delivery of courses exclusively online. The learning materials and the learning experiences are provided solely via the internet.
- Blended learning model, characterised by learning programmes that integrate online learning with complementary offline activities.
- The model of self-managed e-learning, characterised by provision of online learning resources for self-managed learning.
- Live e-learning, i.e. synchronous online learning events involving learners in multiple locations.
- Electronic performance support (EPS). This model uses work-based online learning to support specific tasks, systems or operational procedures

## SYNTHESIS OF GOOD PRACTICES

Our findings of good practices in flexible learning are that:

*Flexible learning encourages frequent and quality interaction between students and faculty.* Our survey results and experience reports show that, when engaged in flexible learning, our students still have the need to interact with the lecturer. The virtual learning process is enhanced by frequent and high quality communication; students across time and geography borders still need academic guidance.

*Flexible learning develops reciprocity and cooperation among students.* In FETCH, we recognize that reciprocity and cooperation are vital transferrable skills for employability in the future. As flexible, and yet engaging paradigm, flexible develops skills that promote knowledge sharing, cooperation, and develop active team-player spirit. Flexible learners need to engage and keep their level of motivation high. We view flexible learning as an active process that uses active learning techniques.

*Feedback is a significant factor in student satisfaction.* Prompt feedback is a good practice which crosses borders. Focus is integral to student's success. A good presentation, delivery and assessment emphasize time on task, communicate high expectations, respect diverse talents and ways of learning and integrate assessment [2].

FETCH partners who have representations at multiple sites and international campuses have the added challenge to increase the *ease of access crossing time and geographical boundaries*, whilst maintaining uniform and uniformly high standards among students.

*Flexibility impacts student retention.* We wanted to determine which technologies are most successful and to what extent they ensure success in students' flexible learning with respect to engagement and retention. We looked not only for evidence of how flexibility impacts student's engagement, but also at the correlation between flexibility and productivity.

### **TRENDS IN FLEXIBLE LEARNING**

We observed the following trends in planning, delivery, and assessment in flexible learning in FETCH:

Planning:

- Planning needs to be emphasized for effective delivery:

Planning needs to take into account the needs of students engaged in flexible learning. Planning needs to consider the needs of students both locally, i.e. on campus, and globally, i.e. distance learning or on partner campuses.

Delivery:

- There is an increasing emphasis on flexible learning in a group environment. In assessment both individual's and group's effort need to be taken into account.
- Guided mode of delivery in flexible learning is still dominant as it is preferred by students.
- Flexible learning promotes the use of versatile delivery channels. Versatile delivery channels give the opportunity to learners to perform at their best as they are an option to cater for different learning styles.

Flexibility promotes acceleration of learning.

Assessment:

- Formative assessment needs to be integrated throughout the course.
- Constructive feedback needs to be timely and well-integrated within the delivery mode.

In planning, delivery, and assessment for flexible learning in general and across FETCH we need to accommodate all learning styles [5]. This is achieved by different type of materials and different ways of planning, delivery, and assessment. In line with what learners in FETCH want, we need to aim to maximize of face to face time as needed as we recognize that for many students flexibility means also frequent access to in-person support. For flexible learners that do not communicate exclusively online, the learning experience is enriched the experience by augmenting lecture theatre delivery. Connectivity beyond the allocated time is expected by learners and provided by educators, as flexibility in FETCH means taking the time to integrate communication as and when needed within any flexible framework.

Effective delivery includes, for example: development of tolerance for ambiguity and recognizing that there may be no "right" answer to a given question. Emphasis on

cognitive flexibility in a flexible learning framework is another suggestion which means being flexible with respect to both assessment and course -content. Use of material that is slightly too difficult for the learners is also encouraged [5].

A suggestion that has been adopted by the partners in FETCH is to use problems that require students to understand and manipulate course content. This adds not only to students' understanding but also encourages students to engage and empowers them to restructure the material so that it best fits their learning needs.

Engaging and productive communication is crucial for the successful delivery of any flexible learning course. Opportunities for high level of interaction, both student to student and instructor to student need to be created to facilitate such communication.

Generally, the richer the communication, the more emphasis is placed on independence. We recognize that independence is a crucial need for FETCH partners and the students across the thematic network.

### **KEY FINDINGS ACROSS FETCH**

We next briefly review our key findings, obtained as a result of the survey analysis, presentations at a thematic workshop and expert interviews.

58.5% of participants in our survey had a blended mode of delivery (on-line and face to face). More than half of the participants actively guided the learning style of their students. This was followed by a proportion 30% who choose self-directed style of learning. 54.7% stated that flexible delivery accelerates pace learning while, 41.5% choose that flexible delivery has no noticeable impact on learning. 69.8% of methods for submitting assignments were a combination of virtual interaction and face to face interaction.

Responses indicated that commonly each course had a combination of different assessment methods to measure theoretical knowledge, practical skills and group work. For example, 22.8% of the responders used printed or electronic textbooks to full their needs. When asked about the course's communication channels, 26.7% answered face to face, followed by email communication 23.8% and Virtual learning environment 22.7%. 47.1% answered that they don't use social networks as a method for learning and teaching of the course. When asked if they use collaborative editing software, 52.9% replied that they do not make use of it, while 37.2% of the participants use it occasionally. 69.8% of the surveyed partners reported that flexibility could lead to higher students' participation, whereas 25.8% of the participants chose continuous feedback as a method to ensure optimal student retention, followed by 24.1% who choose group work.

We observed the following strongly supported trends in planning for flexible learning:

- Mixed mode of delivery is preferred and effective and guided learning promotes optimal learner's engagement and facilitates progress.

Flexible delivery is correlated with faster learners' progress both in preliminary and advanced courses, including courses at graduate level.

- Printed materials (hard-copies) are still predominantly used.
- Electronic textbooks and virtual learning environments are common.
- Submitting assignments is most effective when combination of virtual interaction and face to face interaction are utilized.

We identified the following best practices of assessment in flexible learning across the partners in FETCH thematic network.

- Flexible learning has an impact on students' autonomy and consequently on assessment.
- Students value the opportunity to make independent progress while being supported by an academic and their peers.
- Multiple delivery channels for course information and delivery promote flexibility with students expressing strong preference for written assessment. Significantly, course content is increasingly structured for optimal learning by being subdivided into self-contained sections, hence enabling students to make independent progress.
- Communication, use of social networking, use of electronic textbooks, use of collaborative editing software are increasingly used as enablers of flexible learning across FETCH.

Suitability of the material for different learning styles must be taken into account. Perceiving information, processing information, and organizing and presenting information are carried out in a different way, depending on whether the learners are activists, reflectors, theorists, or pragmatists [5].

We identified that flexible learning in university makes very different demands on learners. For example, the scope of study that flexible learners are exposed to can be much wider. The variety of media and learning materials may mean that flexible learners will need to make informed choices on how to prioritize their learning.

Focus is essential for flexible learners. In higher education the focus is on the learner and the learner is expected to study independently. A predominant trend in FETCH is that the independent learning process needs to be supported by informed guidance in order for the learners to stay focused and motivated.

Optimal scheduling for flexible learning is crucial for the success of any course delivered with the goal to enable flexibility. In the context of FETCH means that the learners still want responsibility for organizing their own schedule, whilst expanding the range of options available for their courses.

Reading for flexible learners means having access to a variety of materials both in electronic and paper form. Different learning styles and the adaptation of any learning framework are extensively discussed, for example in [2].

Students still value recording of lectures even when learning remotely. Video and audio recordings are used by a high number of FETCH partners for their distance learning courses.

Extended time scale is appreciated but not required by flexible learners. Essays and assignments are often set weeks before they are to be handed in. Just like regular learners, flexible learners appreciate being reminded of course structure and associated deadlines by the virtual learning environment that they uptake.

## CONCLUSIONS

In conclusion, we summarize the most significant findings.

The dominant trends in the thematic network FETCH enable us to understand how learners with different learning styles to utilize technology so that they can make progress effectively and yet in a guided way. Delivery of content is achieved via a variety of channels to meet the needs and engage learners with different learning styles.

New technologies are becoming widely available and are enthusiastically utilized. However, within FETCH learners value traditional methods as well: flexibility is enhanced by guided learning and online or mobile modes of delivery are complemented by face-to-

face contact and printed materials. The interactive learning environments are successful in promoting both individual efforts and team-work and are becoming pervasive. Employers value teamwork as well as individual efforts. Flexibility is a key factor in students' retention.

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**The paper has been reviewed.**