D.3.3 PLOT Persuasive Learning Design Framework

Persuasive Learning Designs

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Executive Summary

In this third and final deliverable of WP3: *Persuasive Learning Designs,* the theoretical cross field between persuasion and learning and the practical analysis of the technological learning tools and products which are currently related to the PLOT project, namely the GLOMaker and the 3ET tool, are linked together as persuasive learning designs are defined and exemplified through the four e-PLOT cases.

Based on the literary study of D.3.1 as well as the subsequent discussions and reflections regarding the theoretical foundation and practical application of persuasive learning technologies, this report presents a novel perspective on the definition of persuasive design, and in continuation, an applicable definition of persuasive learning designs.

D.3.3 is formally described as: *"A set of Persuasive Learning Designs (PLDs) appropriately described in terms of theoretical background and expected areas of application, summarized as patterns. These will be used in WPs4 and 5 to guide the implementation of persuasion into the enhanced tools. They will also be made available publicly via the web portal."*

In consideration of the theoretical characteristics of persuasive learning, and in acknowledgement that the results of this deliverable are to be applicable in both WP4 and 5, the persuasive learning designs presented in this report are not summarized as patterns. Instead the definition of persuasive learning designs is presented on more general terms and exemplified in relation to the e-PLOT work cases.

In conclusion, the report presents a number of suggestions regarding the improvement of the two learning tools, which from a theoretical perspective will enhance the persuasive potential, and which can be taken into consideration in WP4 and 5.

About this report

As described in the executive summary, this report presents the culmination of steps taken in WP3, in the process of defining and developing PLDs which are applicable not only within the e-PLOT project, but also at a more general level. The literature on both learning designs and persuasion are vast, yet these areas have not previously been combined in a systematic manner. The initial steps taken towards defining and exploring the areas in which persuasion and learning may complement each other, are based on the belief that both persuasion and learning are highly contextual phenomena where intentions of the designs and the users and the negotiation of intentions are equally important to the applied technology.

Starting with a literary study of the cross field between persuasive and learning, it became clear that the notion of persuasive learning demands reflections which goes beyond simply improving the functionality of technologies. Contextual considerations are a requisite for the fulfillment of a persuasive initiative, as a persuasive technology will most likely fail to persuade users in any direction if not applied within an intended use context. As such the involvement of the e-PLOT work cases and the input they were able to provide has been a vital perspective towards the definition and development of PLD's.

The importance of including the perspectives of the work cases in WP3 was stressed even further by the ethical considerations related to persuasion and to persuasive technologies. By definition, persuasion does not apply cohesion or deception, and it is acknowledged that there is a very fine line between persuasion and manipulation which must be taken into consideration when aiming to develop persuasive designs [1-3]. Failing to consider the use context may not only influence the efficiency of the persuasive technology, but also result in the technology as being considered manipulative or even deceptive – thus by definition discarding the technology as being persuasive.

In acknowledgement of the challenges faced in WP3, the methodological approach applied throughout the entire work package has been highly inspired by and based upon perspectives related to Value Sensitive Design (VSD) and in particular reflections regarding participatory design processes.

VSD is defined as "a theoretically grounded approach to the design of technology that accounts for human values in a principled and comprehensive manner throughout the design process.'' The relevance of considering VSD in relation to persuasive design has already been discussed by a number of researchers [3-5] and also been put to practice in other EU projects [6].

In practice, participatory design methods have been applied in WP3 in terms of an Inspiration card workshop held during the face 2 face meeting in Aalborg in May 2011, which sought to uncover a more nuanced understanding of the challenges related to the individual work cases, and to establish a mutual responsibility and a common language between developers, designers and case representatives. The results of the workshop were presented in D.3.1 and the process was published in form of a peer reviewed paper and presented at Interact 2011 [7].

The aim of the workshop was to create a social context in which the individual case representatives were given the opportunity to explain and elaborate upon their individual challenges in teaching and learning, and for the additional members of the consortium to ask questions and reflect upon the different case scenarios. The general notion was to facilitate a mutual understanding between the individual partners, which was not only vital to the case oriented development of persuasive learning designs, but also essential

to the previously described considerations concerning ethical as an integrated element in the design process. In accordance with Løgstrup's approach to ethical evaluation, the notion of ethics occurs as we interact, and through interaction emerges the mutual understanding and mutual responsibility which may be considered the very foundation of future ethical interactions.

The Inspiration Card Workshop was introduced by Halskov and Dalsgaard as a collaborative method for combining findings from domain studies, represented in *Domain Cards*, with sources of inspiration from applications of technology, represented in *Technology Cards*, to create new concepts for design [8]. In 2010, the method was considered in relation to persuasive design by Davis, and proved itself to be beneficial in terms of providing the applicants with the means to define not only the desired outcomes of their designs but also the ability to discuss persuasive principles in a common language regardless of theoretical knowledge about the Persuasive Technology field [5].

Both Halskov and Davis approaches to the workshop provides the ability to gain substantial width to the range of topics which may be discussed. However, with the overall theme of the consortium meeting being Persuasive design, and in consideration of the defined objective of PLOT (to develop persuasive technologies), it was decided to focus on a narrower and more focused version of the workshop.

With Kairos being highly contextual and a key concept in persuasive design, the domain cards were considered highly essential, yet only produced in a limited number. This was done out of concern that too many cards related to the domain would be of too much influence on the case representatives, thus oppose our overall goal of providing a context where they in their own words could explain their cases.

Contrary, the technology cards were applied as an underlying way of ensuring that the technological designs which were discussed during the workshop, all revolved around intentional and possibly persuasive designs. In order to meet this particular aim, the technology cards applied were primarily examples from the Design With Intent Toolkit, which was developed by Dan Lockton [9]

The DWI Toolkit is designed for direct application in development processes, as inspiration during workshops or throughout the entire process. The approach has been clearly described as work in process, which leaves room for changes and makes the toolkit highly adaptable into other defined frameworks. The toolkit consists of eight different Lenses: Architecture, Error proofing, Interaction, Ludic, Perceptual, Cognitive, Machiavellian and Security, which in total provides 101 different technology cards with inspiring visualisations, comments and questions.

The aim of the toolkit is *"to capture different worldviews on behaviour change and so allow designers to think outside the immediate frame of reference suggested by the brief (or client)[9]*

As such, the lenses do not constitute superior categories, but are instead considered different perspectives on intentional design [10]

The DWI toolkit itself serves as a highly applicable method to structuring workshops which are perhaps not meant to appear too organised. However, the immediate impression of the cards, were that they might in some cases be too abstract for workshop participants who are not used to being part of the actual design process, or accustomed with the terminology and functionality of interactive technologies.

As a result, the workshop held during the Euro PLOT consortium meeting, was primarily framed by the approach designed by Halskov and Dalsgaard, yet targeted towards the intended outcome of both the workshop and the consortium meeting, by applying a selection of cards from Lockton's DWI Toolkit.

Furthermore, the original deadlines of WP3 were extended in order for us to include practical input from the case representatives, as they begun exploring and applying the tools. This resulted in valuable input, as the experiences gained by the different work cases helped enlighten different possibilities and limitations of the tools depending on the context in which they were applied.

Finally, the different perspectives which have been considered in WP3 have been presented and discussed in various forums both internally in e-PLOT and externally. All of which has helped nuance and adjust our perception of persuasive learning and the requirements of persuasive learning design.

In summary, the conclusions presented in this report, are constituted not only by the objective findings related to the prior deliverables of WP3, but also by the experiences gained through the activities which have taken place throughout the process of WP3. The primary outcome of this deliverable is constituted by the wider definitions of persuasive design and persuasive learning designs, which are expected to be applicable and beneficial for all aspects of the further advancement of e-PLOT.

Persuasion for learning

This section provides an overview of the theoretical foundation which forms the basis of Persuasive Learning Designs (PLDs) in Euro-PLOT.

An overview of persuasive technology is provided, as well as a brief introduction to a selection of classic humanistic traditions which have been taken into consideration in order to gain a more nuanced perception of the notion of persuasion and in order to define the wider concept of persuasive design and subsequently persuasive learning designs. Particular attention is drawn towards the perspectives which have been found relevant to this specific project. Subsequently, perspectives on constructive learning are introduced and related to the notion of persuasive design, in order to define and evaluate the presumed cross-field between persuasion and learning.

The perspectives presented in this section where originally introduced in WP3 deliverables report D.3.1 in May 2011. Since then, the theoretical perspective has been expanded and developed further, and selected perspectives have been presented and published as peer reviewed papers [7, 11]

Persuasive Technology

The field of Persuasive Technology was established by the American researcher BJ Fogg, who during his PhD in 1993 initiated the preliminary studies of computers as persuasive agents. In 1998 he published his first paper on the subject [12], and in 2003 his research culminated in the publication of the book Persuasive Technology – Using Computers to Change What We Think and do [13].

Based on a background in social psychology and HCI, Fogg described how computers could in fact be considered social actors, and how theories regarding social influence and persuasion could be considered in a digital perspective.

Fogg defines a Persuasive Technology as:

> *"Any type of interactive computer technology designed with the intent to change people's attitudes or behaviour, without using coercion or deception"*
>
> (Fogg 2003).

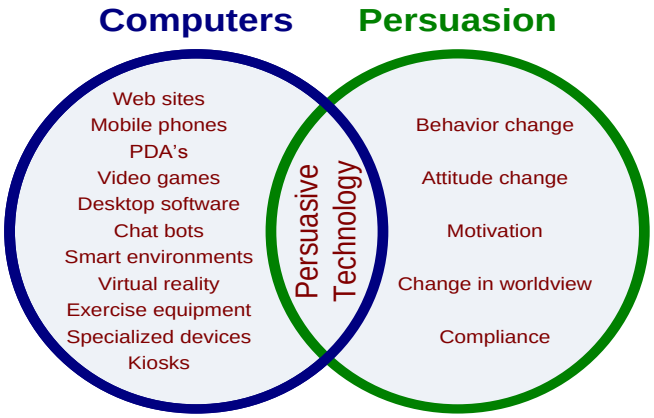


Figure 1- Persuasive Technology - the cross-field between persuasion and interactive computer technologies

Figure 1 visualises how Persuasive Technology is defined as the cross field between the social physiologist concept of persuasion, and the field of interactive computer technologies. Fogg emphasises that only interactive technologies can be considered persuasive, as it is through the interaction between the user and the technology that the technology may constitute the role of a social actor.

According to Fogg, Persuasive Technologies have the ability to change attitudes and behaviours on two levels: macro and micro. The distinction between the two is important in terms of both analysis and development of persuasive designs in most computer technologies. The term Macrosuasion describes an overall persuasive intent of a technology, whilst Microsuasion refers to the use of Persuasive Design principles in technologies which do not necessarily have en overall persuasive goal [13].

In order to apply a more practical approach to the persuasive abilities of computers, Fogg introduces the Functional Triad, in which he identifies three different roles that a computer may fill whilst acting as a persuader.

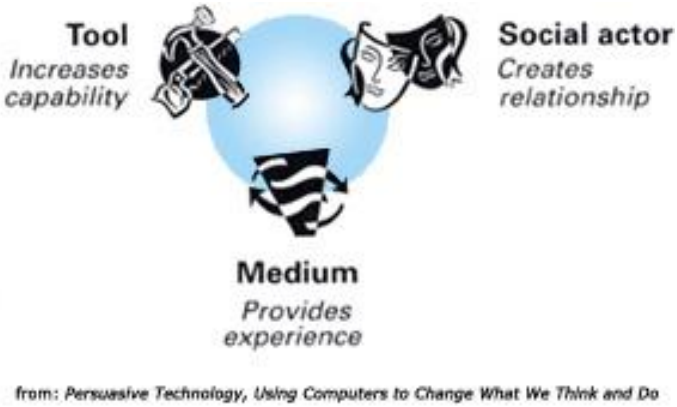


Figure 3 - The Functional Triad

Fogg argues that a persuasive technology may function as a tool, a medium for simulation or as a social actor. For each of these roles Fogg designates a list of persuasive principles, which – if implemented and executed in accordance with the appropriate time and place, will result in a persuasive technology (Fogg 2003):

Role	Ability	Principle
Tool	Making target behaviour easier to do Leading people through a process Performing calculations or measurements that motivate	Reduction Tunnelling Tailoring Suggestion Self-monitoring Surveillance Conditioning
Medium Social Actor	Allowing people to explore cause-and-effect relationships Providing people with vicarious experiences that motivate Helping people rehearse a behaviour	Simulation
Social Actor	Rewarding people with positive feedback Modelling a target behaviour or attitude Providing social support	Social signals

Fogg does not present The Functional Triad as a design method as such, but considers it an overview of the different persuasive strategies which may be executed by a technology. As a result, it is often emphasised that in relation to specific design cases, it is often beneficial to focus on a select few principles rather than attempt to implement all nine into a technological design.

All 9 persuasive principles of the Functional Triad are exemplified briefly in the following table:

Persuasive Principle	Explanation
Reduction	*Reduction* refers to the design strategy of simplifying what would otherwise be a complex process. E.g. Amazon's 1-click purchase which lets you skip a lot of time consuming navigations and tedious form filling, in order to make an instant purchase
Tunnelling	*Tunnelling* is a design strategy which places the user inside a process that has a pre-determined direction. E.g. most installation processes require that the user completes several steps before the installations process is completed.
Tailoring	*Tailoring* is the degree to which a site or a program presents relevant content to individual users or user groups. Navigational options, filtering mechanisms and labelling systems can all be adapted to reflect user demographics.
Suggestion	*Suggestion* is the persuasive design strategy of delivering a message at the opportune moment. E.g. when Amazon suggests extra books which are closely related to the one you were just about to buy.
Self-Monitoring	*Self-monitoring* is the design strategy which allows you to monitor progress. E.g. sites which require a log-in and then enables the user to monitor the progress of weight loss.
Surveillance	*Surveillance* is closely related to self-monitoring; however the monitoring is not done by the user but by the system or the owners of the system. E.g. when using a weight loss website, users may be motivated not only by monitoring their own progress, but also by sharing experience and receiving feedback from other users who are struggling with similar issues. By sharing statistics, diet-plans etc. users feel more related to each other and may be inspired by actions taken by others.
Conditioning	*Conditioning* refers to the strategy of embedding emotional feedback into a design. It is often expressed as praise and rewards, but in a slightly more subtle manner than be the case with *Persuasive Social Actors*. E.g. when forums reward users with increasingly lofty titles (or user rights) in correlation to the number of posts made by the user.
Simulation	Simulation is a design strategy which enables the user to explore and experiment in a safe, nonthreatening environment. It shows a link between cause and effect clearly and immediately, and may appear as a subtle type of persuasion, as the user builds personal experience though the simulation
Social Signals	Social signals is the type of design principles which – like conditioning embeds emotional feedback into a design, but which may be considered more direct. E.g. rewarding users with positive feedback and providing social support. Examples of persuasive social actors are the chat bots which are seen on websites such as SAS and IKEA, where the computer gives advice and feedback in a human like manner. Social signals also include the impact of physical attractiveness.

Fogg's approach to Persuasive Technology is as mentioned based on social psychology, and the ideas presented in the textbook from 2003 are focused on uncovering the abilities of persuasive computers,

rather than actual suggestions as to how Persuasive Designs should be created in practice. Other researchers have since then presented highly qualified suggestions regarding more development based conceptualisations of persuasive principles. However, one of the greatest challenges of Persuasive Technology – the ability to accurately estimate the appropriate time to initiate a persuasive principle - has yet to be overcome (Gram-Hansen 2010).

Persuasive design in a Human Centred Perspective

In exploration of the notion of persuasion, and in the aim of extending the theoretical foundation of Persuasive Designs, Centre for Computer Mediated Epistemology at Aalborg University approaches the challenges of this novel field from a foundation in classical humanistic traditions such as rhetoric, logic and ethics. To a great extent, focus is aimed at the development of theory and methodology which will facilitate and improve the relatively newly established research area, and we refer to our particular approach as Persuasive Design.

Persuasive Design as described in the following sections, is based upon the original perspectives presented by BJ Fogg when he defined and introduced the notion of Persuasive Technology [12, 13]. This taken into account, a few distinctions have been made to Fogg's original framework, in order to facilitate not only the humanistic perspective to Persuasive Design, but also to enable the immediate establishment of an overlap between persuasion, didactics and pedagogy.

In relation to the actual concept of persuasion, Miller argues that in order to gain an in depth understanding of the concept, it may be beneficial to distinguish between three different behavioural outcomes which are commonly served by the persuasion process [14]. Miller makes the distinction between persuasion as a shaping process, a reinforcing process and a changing process, and argues that this distinction is vital not only to the perception of the concept of persuasion, but also to the process of designing a persuasive action – one must clearly define the persuasive outcome in order to successfully plan the persuasive initiative. In acknowledgement of Millers definition of persuasion as being more nuanced than simply changing an attitude, we approach Persuasive Design based on the following definition:

> "*Any type of interactive computer technology designed with the intent to create, reinforce or change people's attitudes or behaviour or both*"
>
> [15]

Another important consideration with regards to Fogg's definition of Persuasive Technology is that the perception of technologies as holding endogenous intentions, as well as the disregarding of exogenous intention may be considered problematic. By his definition of persuasive technologies, Fogg stresses that the field of Persuasive Technology focuses upon endogenous or *built in* persuasive intentions alone, and that the persuasive intention is a core element of the design. However, this perspective is problematic for several reasons.

The designer will most often have a specific intention with the design of a technology, but this intention is often more complex than "wanting to motivate people to quit smoking", and the user's intention towards applying a specific technology, must to some extent be motivated by exogenous factors. As a result, the

notion of intention in relation to Persuasive Design also calls for an adjusted and more nuanced perspective [16]

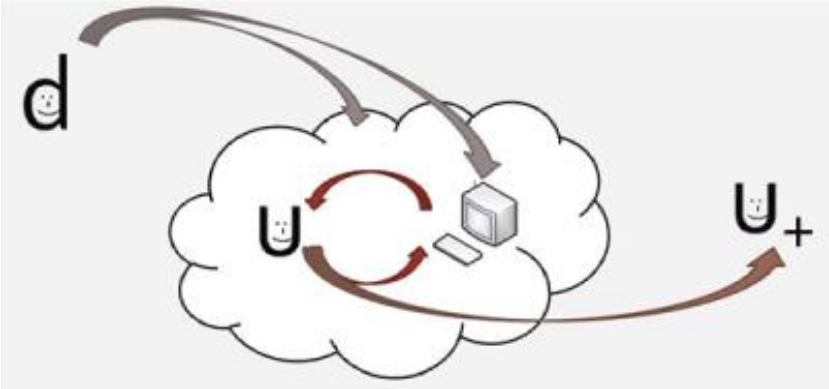


Figure 2 - The intention of a technological design concerns both the technology and the use context

Figure 2 illustrates that the designer's intention concern both the technology, and the context in which the technology is to be applied. The technology, whether this is a PC, a mobile phone or any other interactive device, holds a variety of capacities which may facilitate the designer's persuasive intention. Once applied within the intended context, the user and the technology reciprocally influence each other, resulting in an alteration of the context and in the user being persuaded to change attitude or behaviour. The intention remains a human characteristic, whilst the technical capacity of the technology serves to support the fulfilment of the persuasive intention.

This adjusted perception of the intention, compared to the original definitions introduced by Fogg, emphasises the importance of considering the context when designing persuasive technologies. In order for a persuasive intention to be successfully met, there must be an appropriate balance between the endogenous intention of the designer and that which motivates the user to apply the technology.

Designers are limited to conceiving the intended use of a technology, with no means to assure that the practical use will correspond. Once a technology is put to use, its employment as well as the users perception of the endogenous intention, is influenced by the context in which it is applied. When applied within the appropriate context, a technology may prove itself to be a highly efficient persuader, but if applied without consideration of the context, the Persuasive Design could fail to fulfil its persuasive goal, or be considered unethical [16].

Persuasion in a rhetorical perspective

The very idea of persuasion is commonly considered as having been brought into the world by classical rhetoric. In the 2003 textbook, Fogg made reference not only to the ideas presented by Aristotle, but also to the rhetorical notion of Kairos which may be defined as *the opportune moment* to perform a persuasive action. Modern studies of persuasion are naturally influenced by other disciplines too, notably social psychology, anthropology, marketing and advertisement studies, usability and IT design etc. None the less, the field of Persuasive Design may still benefit from perspectives introduced by rhetorical theory, modern as well as classical [17]

Classical rhetoric has been systematically related to social psychology by Michael Billig [18]. A central statement in Billig's *Arguing and Thinking*, is that we may gain significant insight into human perception by exploring argumentation and especially by studying what classical rhetoric has to say on the subject. Billig observed that social psychology had had a tendency to identify thinking with rule-following. From classical rhetoric he learned, however, that while arguments and thought may well be based on rules, rules themselves arise from arguments, and indeed, may be disputed by arguments. That is to say that while rules do exist, they are not deterministic. One should not rely on the assumption that following certain rules will always yield the desired results [17, 19].

Besides from providing insight to the notion of persuasion in general, the field of rhetoric also offers valuable input in terms of key terminology and concepts which are vital when designing and developing persuasive technologies. Amongst these concepts is the previously mentioned notion of Kairos.

Kairos is often described as timing, or the ability to perform the appropriate action at the right time and in the right place. In term of appropriate, the performed action is required to be not only effective but also ethical. The concept sums up the principle that any rhetorical approach is based upon the specific situation, and that comprehension of the context as such is one of the most vital resources when deciding upon rhetorical means to apply to a given argument [20] Hansen specifies that the definitions of Kairos vary from narrow translations such as "particular point in time" and "specific circumstance", to wider concepts such as "situation", "occasion" and "opportunity".

The narrow translation of Kairos is easily related to the rhetorical concept of Aptum, and is as such more applicable to the specific communicative situation. The wider definition however, contributes to the understanding of the ontology of rhetoric, as it clarifies the fields influence upon the world. Not only does rhetoric construct situations with an epistemological potential, it also shares a connection with the concept of doxa (unwritten rules or joint conviction), thereby relating Kairos to practical knowledge and experience, in contradiction to knowledge in the philosophical sense.

When considering the different meanings of Kairos in a Persuasive Design context, the narrow definition serves well in relation to specific design related choices, such as determining the appropriate time for initiating a persuasive strategy (i.e. triggering a specific behavior), an argument which has been raised by several researchers over the years [21, 22] The wider definition on the other hand, supports the argument that in order to successfully select and apply a persuasive principle to the design of a technological device, the designer must beforehand acquire a fundamental understanding of the context in which the device is to be applied, and use this knowledge to create a technology which will be appropriate to the given situation.

Kairos in a technological context

Kairos in itself is a powerful and multifaceted concept which is not easily formalized. As such, even though Kairos is vital in relation to successful persuasion, the concept in itself does not translate easily to the digital context of persuasive technologies. However, the challenges related to integrating the notion of Kairos in the development of interactive technologies, may be addressed by considering Arthur Priors perspectives on temporal logic. More specifically, the development of Persuasive Designs may benefit greatly from

Priors arguments that time is not only a specific moment but also a wider contextual concept, which he distinguished between as A-time and B-time

Prior notion of B-time refers to the objective perception of time, which has dominated the philosophical and the scientific debate for centuries and which is expressed by for instance traditional calendars. A-time on the other hand refers to the contextual perception of the present moment, and takes into consideration the unbalances which are caused by previous events [23].

Kairos as it is described by Hansen, may be related to A and B time, by considering Priors notion of A-time as the formalization of Hansen's wider definition of Kairos, whilst Priors notion of B-time may be related to Hansen's narrow definition of the concept.

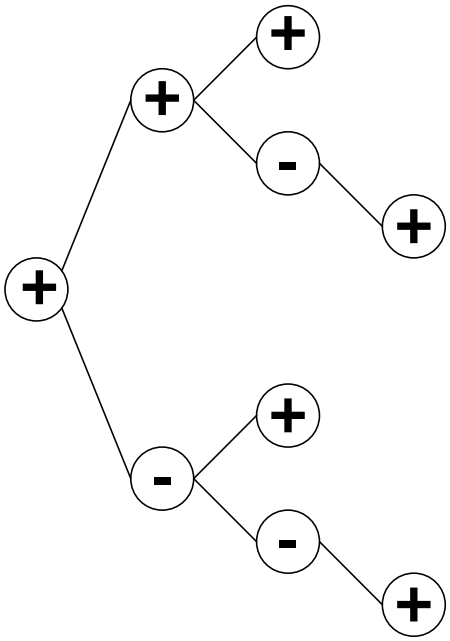


Figure 4 - Time tree visualising a systematic sequence of events. + indicates that the users has performed a positive action, - indicates a negative action.

The visualisation in Figure 4 illustrates a systematic sequence of events, in which a person goes through specific processes in order to get from the beginning of the program to the end. This could be a computer system in which the user completes individual steps in order to accomplish a greater goal. As such, B-time is related to the complete process, providing an overview of the steps to be completed, whilst A-time is related to the individual moments in the process where the context changes and the system must adapt to new circumstances.

To exemplify this even further, the computer system described above, could be a system designed with the intention to motivate the user to quit smoking. As such, the intended outcome is dependent on process which the users must go through, during which the user will find himself in situations where the system must motivate the continuous process towards the set goal. First intermediate aim could be to not smoke during lunch break. If this is accomplished, the system may praise the user for the display of willpower, and

contrary if the intermediate aim is not achieved, the system may motivate the user to try again during the next customary smoking break. In the given example, praise from the system will only be contextually appropriate if the user does in fact abstain from smoking.

The importance of considering not only Kairos but also Prior's notion of A- and B-time in the development of persuasive systems, is elaborated upon even further by Louise Glud and Julie Jespersen, in a conceptual analysis of Kairos in relation to location based services. They conclude that inclusion of Kairos in the development of mobile persuasive technologies is spatiotemporal and demand that all conceivable time dimensions are taken into consideration [22]

The different perspectives of Kairos presented by Hansen are inseparable in the respect that both must be taken into consideration when determining the appropriate moment to initiate a persuasive action. Likewise A- and B- time cannot be considered as individuals, bur must both be taken into account when designing persuasive systems. In order to fully conceive the notion of appropriate timing, one must include both a broader understanding of the defined aim of the process, and consider the contextual reality of the user whilst the steps of the system is being completed [24].

Ethical evaluation of persuasive design

Besides from addressing the importance of appropriate timing of persuasive initiatives, Kairos also emphasizes the importance of ethical reflections in the design process. The acknowledgement that persuasion must take place in an appropriate manner, does not only refer to selecting the principles to implement in a system, but also to a general understanding of the context in which the technology is to be applied. As a result, this final part of the introduction to Persuasive Design will address some of the challenges related to ethical evaluation of persuasive technologies, and describe the initial steps taken towards an approach to ethical evaluation which takes the contextual dimension of Persuasive Design into consideration.

As previously mentioned, Fogg defines persuasive technologies as computer systems which persuade without using coercion or deception [13]. The definition indicates that there is a very thin line between persuasion and manipulation, and that ethical evaluation is an important aspect of the development process. However, the definition is also highly problematic from an ethical perspective, as the perception coercion and deception is in fact contextually dependent. That which is deceptive in one context may not be considered as such in another, and that which is considered completely ethical in one use scenario may be considered highly unethical in another.

In order to address these challenges, steps have been taken towards a three dimensional approach to ethical evaluation, which considers not only the consequences of the technology but also the intention and the use context. This has resulted in the paper *Towards a Context Oriented Approach to Ethical Evaluation of Interactive Technologies[7].* The paper was published and presented at Interact 2011 and the original full-paper version included the following section concerning the ethical evaluation of persuasive and interactive computer systems

Traditionally, ethical reflections are approached from one of two philosophically opposite perspectives: The utilitarian approach which evaluates an action by its consequences and the deontological approach which

relates to the ethical duty of the actor and seeks to construct rules and maxims by which the actors should abide. Unfortunately, neither of these approaches appears individually sufficient in the evaluation of interactive technologies, as none of the perspectives include contextual considerations.

Commonly used approaches to ethical evaluation of technologies such as the ACM Code of Ethics, tends to place the primary responsibility of applying a technology, on the designers and developers, thus discarding the responsibility of the users who apply the technology. Contrarily, Albrechtslund argues that designers, are limited to conceiving only the intended use of a technology, but have no way of ensuring that the actual use will resemble their intentions. Once a technology is developed and handed over to the users, the perception of both the technology and the intended use is influenced by the context in which it is applied and the social reality of the users. In fact, the usage more often deviates from the original intention, making it inequitable to hold the designers solely responsible for the consequences of a technology [4, 16].

However, the acknowledgement that the designer is unable to foresee all possible use scenarios should not be interpreted as an excuse for the designer to disclaim responsibility for unethical use of a technology. Contrary, once aware that the technology may potentially affect users far beyond the intended aim the designers should more than ever be aware of the reciprocal responsibility which emerges between themselves and the users - and as such, ethical evaluation should be initiated from the very beginning of the development phase, whilst the notion of the technology is matured and explored [16]. Put to practice, the ethical evaluation of interactive technologies should include both deontological and utilitarian perspectives– in spite of the fact that these perspectives are philosophically opposites.

When considering the visualisation in Figure 1, the deontological perspective is primarily related to the designer and the intended use of the interactive technology (d), whilst the utilitarian perspective relates to the consequences of the technology being applied in a given use context (U+). As such, both the deontological perspective and the utilitarian approach to ethical evaluation must be considered when evaluating interactive technologies. However, with technologies being applied globally and cross culturally, the contextual perspective must be taken into similar consideration in the evaluation process, and neither the utilitarian nor the deontological viewpoints provide a sufficient theoretical foundation for this third and vital dimension.

Applying Løgstrup as a contextual perspective

In the process of defining a theoretical foundation for ethical evaluation which is applicable throughout the entire design process, the reflections and perspectives presented by the Danish philosopher and theologian K.E. Løgstrup may be a significant contribution to the previously described combination of utilitarian and deontological perspectives.

Løgstrup finds that ethics, rather than being based on reason, is founded in what he calls sovereign expressions of life, which includes benevolence, open speech, trust, love and compassion – in other words human features that are generally considered ethical. He furthermore argues that we are born into ethics as a result of the dependency which exists between humans. As soon as humans interact, they influence each other's lives, and it is by interaction that ethics and ethical responsibility emerges. Humans are inevitably entangled, and must be willing to acknowledge responsibility for the impact we have on each other's lives. Just as we are able to enrich the lives of one another, we are also able to inflict terrible

damage to each other, and as such we must recognize and comply with the power structure which exists between us [1, 25].

Furthermore, Løgstrup stresses that the perception of ethics is based on the contextual reality of the individual, i.e. ethics is considered an intuitive result of human nature, rather than moral rule based on reason, and the distinction between ethical and unethical actions are dependent on the specific situation and the social reality of the people involved in the interaction.

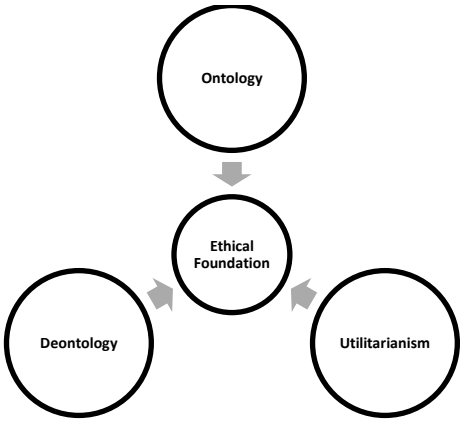


Figure 2 - A three dimensional approach to ethical evaluation

Adding Løgstrup's ontological approach to ethics as a third dimension to the previously mentioned collaboration between utilitarian and deontological traditions, supports the notion of a reciprocal responsibility between the designer and the user of a technology, perhaps even more so if considering the design of technologies a particular type of interaction in itself. In general, technologies of all types are designed in ways which indicate to the user how the technology is meant to be applied. Colours, shapes, buttons and icons all provide the user with information which – dependent on the user's previous experience with similar technologies, guide the user through technology employment. As such, the act of designing a technology can to some extent be considered a particular type of communication or even interaction between the designer and the user [1, 16].

In this perspective, the designer becomes an active participant similar to the user who applies the technology. In accordance to Løgstrup's approach to ethics, the ethical responsibility is then shared between the designer and the user. The responsibility of the designers is apparent due to their role as creators of the technology, but the co-responsibility of the users with regards to the influence the technology has on them and the use context must not be undermined. The users' ability to apply technologies beyond ways which are foreseeable for designers, demand that the users' are to some extent held responsible for their own actions.

Considering Løgstrup in the ethical evaluation of interactive technologies is not unproblematic. Firstly because Løgstrup argues that the perception of the ethical action is based on the intuition and social reality of the person performing an action – making it impossible for others to evaluate the action. Secondly because the notions of ethics which are presented by Løgstrup originate from reflections concerning humans who are physically located at the same place, thus sharing a common understanding for the

characteristics which define the specific context. Being in the same place is no longer a necessity when interacting through technology, and when the interaction takes place between the designer and the user, they will most often not be found at the same place.

As a result, the ethical perspective presented by Løgstrup cannot stand alone in the evaluation of interactive technologies, but must be applied as a third dimension to the collaboration between utilitarian and deontological perspectives. Løgstrup's contribution serves as a support of the theoretical foundation with reflections regarding concepts which are as essential in interaction through technologies as they are for physical interaction between humans. In particular, Løgstrup offers valuable philosophy concerning key concepts such as trust, credibility and interaction." [7]

Notions of teaching and learning

This section holds an introduction to the theoretical perspectives on, didactics and learning which are estimated to be of particular relevance to the Euro PLOT project. In particular, attention is drawn towards reflections regarding *outcome based learning*, as well as the notion of *constructive alignment* as it is described by John Biggs and Catherine Tang [26]. Furthermore, in continuation of the previous chapter's description of the cross field between Persuasive Design and classical rhetoric, this chapter identifies how rhetoric also shares specific commonalities with modern teaching.

Learning as a mutual responsibility between teacher and student

> "*How effectively we teach depends first on what we think teaching is.*"
>
> [26]

According to Per Fibæk Laursen, that which separates teaching from other activities such as propaganda and indoctrination, is the particular intention of the teacher – namely that the students are to learn something specific. The distinctive characteristic of the intended learning scenario is that the teacher wishes to motivate and encourage students to relate to and reflect upon the subject in a specific way. The aim is to make the students gain a deliberate and positive impression of the content of the subject, and to motivate an aspiration within the students to learn more. As such, teaching may be characterized by a double intention, i.e. the teachers intention to motivate the students intention to learn [27].

In modern western countries, we may add that we also strive towards teaching students to respond critically to the subjects and content they are introduced to, contrary to advertising companies and propagandists who strive towards noncritical acceptance.

Laursen's reflections on teaching and learning, not only links nicely to the previously described position that successful persuasion calls for consideration of not only the persuasive intention of the designer, but also the intentions of the user. In fact, one immediate overlap between persuasion and learning may be that they both depend on a negotiation of intentions between the persuader and the Persuadee.

Learning Objects and similar types of learning technologies, have often been criticized for not taking learning theory and pedagogy into consideration when developing learning objects [28-30], they are often described as taking a "water fall approach" to learning, by which "knowledge" is presented through a technology and students are expected to learn simply from being exposed to the learning material in a

different and multimodal way. One primary issue with this approach to learning is that focus is on the presentation of the learning material, rather than on the actions of the learner.

In the acknowledgement that persuasive technologies by definition require interaction between the user and the technology, it appears that one of the benefits of considering persuasive design in relation to learning objects may be the promotion of a more constructivist approach to learning, in which student motivation and activity is considered a requisite for learning. By doing so, the theoretical foundation also considers the 3ET tool which by nature calls for students to engage in learning activities and build upon their existing knowledge as they practice and train new aspects of grammar.

Outcome Based Learning and the notion of Constructive Alignment

Amongst the widely accepted approaches to constructivist learning, is the notion of Constructive Alignment (CA), which was introduced by John Biggs and Catherine Tang [26].

Biggs and Tang refer to three different levels of teaching out of which the first two are blame models, first level blaming the student and the second level blaming the teacher. The third level integrates learning and teaching and considers teaching as motivating students to use the provided learning activities in order meet the intended learning outcome. With this third level of teaching Biggs and Tang relates their approach to teaching to the notions of outcome based learning (OBL) and constructive alignment (CA).

OBL is traditionally a teaching method which distinguishes itself by focusing on the student and by acknowledging that different students learn in different ways and may as a result require different styles of teaching. The notion of OBE has been implemented in a wide variety of ways which all share some commonalities. In order to explain the development in OBE, Biggs and Tang distinguish between three versions, and point these towards the notion of CA.

In the first version of OBL, the intendeds learning outcomes were made individually for each student, so that everyone would achieve some sort of success. Contrary, the second version defines the intended outcomes at an institutional level, thereby comprising average student performances in order to meet the requirements of external stakeholders. In the final version, outcomes are defined to enhance teaching and assessment, not to serve any other purpose. The essential feature of this last version is that intended outcome statements are made out for each course and for each individual lecture within that course. Intended outcome statements are not lists of topics that the teacher will cover through a curriculum, they are statements explaining what needs to be recognized in order to determine if the students have learned that which is intended [26].

Biggs and Tang expand the notion of OBL even further, as they introduce the concept of CA. CA is constructive in the extent that it is based on the constructivist theory that learners use their own activities to construct knowledge (or other outcomes). The alignment reflects the notion that the learning activity in the intended outcomes, needs to be activated in the teaching if the outcome is to be achieved. If the intended outcome is to learn how to drive a car, focus should be placed on the activity itself, i.e. driving, rather than be focused on giving lectures on how to drive. Finally, the assessment should focuses on how well the car is driven. In short, the teacher aligns the planned learning activities with the intended learning outcomes. [26].

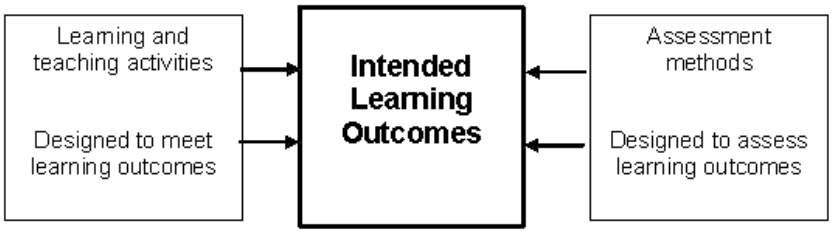


Figure 3 - Constructive Alignment

As illustrated above, CA centers the intended learning outcomes, and learning activities and assessments methods depend on these intended outcomes, resulting in an appropriate balance between learning activities and evaluation.

One of the fundamental notions in CA is that the achievement of intended learning outcomes depends on a mutual responsibility between the teacher and the student. This also occurs to be the primary divergence from traditional OBE, where responsibility is placed solely on the teacher. CA on the other hand acknowledges that whilst the teacher is responsible for creating the appropriate learning environment, the actual learning is something which takes place within the individual student. The teacher may inspire and guide, but in the end the student is responsible for his or her own learning.

By considering learning a mutual responsibility between the teacher and the student, the notion of learning may be related to the previous argument that there must be an appropriate balance between the intentions of the designer and the intentions of the user if a Persuasive Design is to be successful.

Didactics in a rhetorical perspective

In the first chapter of this report it was argued that Persuasive Design may easily be linked to the field of classic and modern rhetoric, and that some rhetorical concepts could in fact be considered essential to the perception of persuasion and to the process of designing persuasive systems. Similarly, rhetoric constitutes some of the fundamental aspects of modern teaching. As a matter of fact, the act of teaching in itself may be considered an act of persuasion.

Students who attend a lecture are to some extent persuaded to change attitude towards a subject, depending on the teacher's ability to present the subject material in an appropriate manner, and to conduct the lesson in a way which upholds the engagement and interest of the students. Kairos once again becomes a key concept as the teacher accommodates contextual changes into the planned lesson, and even the preparatory phases before the actual lecture takes place, calls for considerations concerning timing, use of location and manner in which the material is introduced.

Furthermore, rhetoric provides a solid methodological approach to preparing and performing a persuasive speech. In classical rhetoric the preparation of a speech consists of five preparatory disciplines or cannons, which each play an essential role in the aim of delivering a persuasive speech. The initial four disciplines are all related to the preparation of the speech and the material, whilst the final discipline deals with the actual performance. In order to exemplify this, the table below provides a brief description of the individual disciplines and connects them to specific actions which take place as a lesson is prepared.

Rhetorical discipline	Preparatory phase in didactics
Inventio is the discipline in which the material which is to be presented is gathered. This part of the cannon is not be mistaken as the act of inventing or creating material, but to be understood as the phase in which the key concepts of the speech are defined	This is the phase in which the key elements which are to be included in the lecture are localized and defined. For instance, a lecture on Persuasive Design might include not only an introduction to Fogg's approach to Persuasive Technology, but also include the human centred perspectives which were described in the previous chapter. This phase may furthermore include selecting appropriate examples to illustrate key points within the lecture.
Dispositio is the discipline in which the gathered material is structured so that it may be presented in the manner and order in which it is most likely to facilitate the overall persuasive goal	In terms of preparing a lecture, this would include creating the overall plan for the lesson. Considering the length of the lesson, and making sure that all key points are given enough time to be fully explained.
Elocutio refers to the appropriate and opportune manner in which the gathered and structured material is presented. It is considered the most comprehensive rhetorical disciplines, as it reflects not only upon the formulation of clear statements, but also on selecting the appropriate sound and visual illustrations to facilitate these statements. The perfect style of speech contains a maximum of clarity and efficiency.	Depending on the location of the lecture, this discipline includes the preparation of i.e. PowerPoint slides, audio equipment and general location facilitation. The discipline also includes reflections concerning a more detailed timing of the elements of the lecture, in order to ensure the constant attention of the students.
Memoria is the discipline of memorizing the prepared speech. From a rhetorical perspective it is crucial that the speech has been memorized so that one does not simply read aloud from a manuscript. The speech must occur natural to the speaker as this founds credibility not only to the speaker, but also to the material being presented.	When teaching, memorizing the speech does not only impose credibility, it also enables the teacher to improvise during the lecture. I.e. allowing students to ask questions and to provide elaborative examples to the material being presented. The ability to adapt the scheduled lecture in order to accommodate contextual changes is pertinent in relation to grasping Kairos and accomplishing the intended learning outcome.
Pronuntia is the final of the five cannons, and the only one which reflects directly upon the actual presentation. Pronuntia focuses on the pronunciation of the speech, the diversity in the tone of voice, use of mimic, and finally the use of body moments whilst presenting an argument.	The ability to raise ones tone of voice, while lecturing, can be a powerful way to accentuate important arguments. Use of body moment may not only help underline important points in the speech, it also helps set the mood for lecture.

When considering rhetoric in relation to the notion of constructive alignment, the five cannons may serve as a methodological approach to preparing the learning activities and material which has been selected on the basis of predefined intended learning outcomes. As such, classical rhetoric facilitates didactics with a framework for preparation of the successful lecture, and with key concepts which may inspire a deeper reflection in teachers with regards to how the teaching material is presented.

Defining the cross-field

As described in the introduction to Persuasive Technology, Fogg defines Persuasive Technology as "*any interactive computing system design to change people's attitudes or behaviors*" [13].

A Persuasive Design may as a result be considered as a design which represents an intention to motive attitude or behavioral changes, and as illustrated in the table below, some of the key concepts of Persuasive Design are also essential when creating OBE learning designs.

Persuasive Design	OBE as defined by to Biggs and Tang
• Originates from a persuasive intention • Considers the requisites of the users • Requires that the users is aware of the persuasive intention • The persuasive intention is met through use of one of more persuasive strategies • Is dependent on timing and contextual awareness	• Originates from an intended learning outcome • Considers the requisite of the students • Requires that the students are aware of the intended outcome of individual lectures and courses • The intended learning outcome is achieved by use of rhetorical and didactic strategies. • Is dependent on timing and contextual awareness.

The table provides an overview of some of the commonalities which are immediately apparent at a very general level. It is expected however that even more shared features will be identified as the work in PLOT progresses and practical experience with the design of persuasive learning objects is acquired.

Whilst defining the cross field between persuasion and didactics constitutes and important aspect of defining the concept of persuasive learning designs, the Euro PLOT project will benefit equally from considering the aspects in which persuasion and didactics distinguish themselves.

In spite of the novelty of Persuasive Design, it appears that the human centered perspective presented previously in the report, may be a valuable contribution the field of didactics. In particular aspects of Persuasive Design may provide nuanced perspectives to teachers who aim to motivate students to actively engage in learning. Although Persuasive Design focuses on the design of interactive computer technologies, the design principles are not limited to virtual implementation. The structure of a lecture can be considered an example of the persuasive principle of tunneling, and depending on the content of the slides, teachers may include principles such as suggestion and simulation into their presentations. Finally, the rhetorical notion of Kairos which is considered one of the key concepts within Persuasive Design may also impose more nuanced reflections concerning the timing of a lecture and the facilitation of the location.

Likewise the field of persuasive design is likely to be enriched by the perspectives on didactics which have been presented in this report. In particular the notion of CA may be related to the described necessity of ensuring an appropriate balance between the designer and the user of a Persuasive Technology, and CA may contribute with perspectives on how to establish this balance.

In the development of persuasive learning technologies, considerations concerning Kairos and the connection to Prior's A- and B-time, may be of particular relevance, as the computer mediation of learning material will greatly influence the learning experience. The introduction to classical rhetoric briefly touched

upon the importance of the teacher's ability to make immediate adjustments the presentation if the context calls for it. For instance if students are struggling to understand the material presented, or opposite, if the material is too easy and the students appear to be losing interest. When teaching and learning becomes computer mediated, the means to adjust and modify are altered, and must to some extent be considered to even greater detail prior to the implementation of the learning technology. System embedded adjustments dependent on student activity, or perhaps even notions of branching time, may serve as a way to ensure the persuasive characteristics of PLOT.

Finally, the aspects on ethical evaluation which have briefly been introduced in this report are relevant not only when designing interactive technologies, but also when designing learning experiences. Considering the ethicality of the intended outcome of a lesson is a necessity regardless if the material is being mediated through a computer technology, and the acknowledgement that learning is dependent on a mutual responsibility between the teacher and the student, may be supported by the ontological approach to ethics which is introduced by Danish philosopher K.E. Løgstrup.

As such, the act of teaching in itself may be considered an act of persuasion. Students who attend a lecture are to some extent persuaded to change attitude towards a subject, depending on the teacher's ability to present the subject material in an appropriate manner, and to conduct the lesson in a way which upholds the engagement and interest of the students. Kairos once again becomes a key concept as the teacher accommodates contextual changes into the planned lesson, and even the preparatory phases before the actual lecture takes place, calls for considerations concerning timing, use of location and manner in which the material is introduced.

Persuasion in Practice

This section presents a summary of the immediate understanding of 3ET and GLOMaker as persuasive technologies.

Attention is primarily drawn towards the findings in WP3 deliverables report D.3.2 – Persuasion in practice, in which both GLOMaker and 3ET were analysed from a persuasive design perspective. Within D.3.2, the main goal was to explore how the theoretical perspectives presented in D.3.1 are currently represented in the tools, in particular the notions of persuasive design and constructive alignment.

Whilst D.3.2 provided insight into how principles related to persuasive technology are currently applied in 3ET and GLOMaker, the overall perception of these tools as persuasive learning technologies, is constituted by the previously mentioned discussions, reflections and experiences gained throughout the entire process of WP3. Besides from the specific analysis of the tools, they have both been presented and discussed when members of the e-PLOT consortium have met. The tools have been tested by case representatives within e-PLOT and by collaborative partners beyond the consortium, and throughout this process, valuable feedback has been provided, and much insight has been gained with regards to the persuasive potential of the tools.

Acknowledging that the understanding of 3ET and GLOMaker as persuasive technologies goes beyond the objective systematic analysis of the tools is particularly important in relation to 3ET, as the learning material presented through this tool represents a complexity which requires context specific knowledge which goes beyond that of general members of the e-PLOT consortium.

In other words, a simple system analysis of the tools would not have provided sufficient insight into their persuasive potential, as only those who already work with the 3ET tool would have the necessary knowledge about the system to explore its functionality and potential. This prior knowledge to the system might however influence their analytical objectivity and make them inattentive to elements within the system which may have severe consequences for new users' perception of the tool.

As such, the discussions and reflections which have taken place throughout the process of WP3, and in particular the contributions made by partners who have no prior knowledge about the two learning technologies, are considered vital to the understanding of persuasion in practise -thus emphasising the importance of the previously described methodological considerations to involve aspects of VSD in the development of persuasive learning designs.

Persuasion at multiple levels

D.3.1's preceding exploration of a theoretical cross field between persuasion and learning, indicated that Constructive Alignment (CA) should be regarded a key concept to the approach to persuasive learning within e-PLOT. One of the fundamental aspects of CA is the acknowledgment that achieving an intended learning outcome, is dependent on a mutual responsibility between the teacher and the student. The teacher is responsible for creating the appropriate learning environment, but the actual learning is something which takes place within the individual student. Likewise, there must be an appropriate balance between the designer and the user if a persuasive design or a persuasive technology is to be effective[31]

Besides from being a potential key concept in the cross field between persuasive design and learning design, the notion of CA also facilitated the methodological approach to the analysis of persuasion in practice, by emphasizing the existence of a mutual responsibility between the teacher and the student. The notion of mutual responsibility and CA may reasonably be related to different levels of persuasion in PLOT, which was first introduced by Henrik Schärfe at the PLOT kick off meeting in Leeds:

Level	Persuader	Persuadee	Message
1	Designer	Teacher	Tool design/Feedback
2	Teacher	Student	Learning Designs

The first level of persuasion (designer → teacher, is the only level which the developers and designers within the PLOT consortium have direct influence upon. The second level of persuasion represents the intended outcome of the PLOT project, in which teachers take the role as persuaders, and create persuasive learning experiences for their students.

If e-PLOT is to consider concepts such as CA in the development of PLOTS, attention must be directed not only towards the end-persuadees (students), but also towards the users of the tools being developed in PLOT (teachers). The tools must be designed in a way which motivates teachers to create inspirational and exciting learning experiences for the students, in order for the produced learning objects to be persuasive. They must be intuitive, easy and fun to use. As such, the PLOT project to some extent represents the cross field between two different perspectives on interactive technology development which both originate from Fogg's notion of persuasive technologies; namely the notion of persuasive design, and the even more novel concept of motivating information architecture [32].

Both GLOMaker and 3ET were analysed and discussed from a persuasive design perspective. In acknowledgement of the architectural differences between the two tools, the approaches taken to the analysis were quite different. Whilst GLOMaker in its current form appears to be primarily a tool for developing instructional learning objects, 3ET is more easily defined as a tool for creating EMDROS based exercises. As a result, each tool was approached individually from a common theoretical perspective which primarily consists of the persuasive principles originally introduced by BJ Fogg [13].

GLOMaker in a persuasive technology perspective

Introduction to GLOMaker

"GLO Maker is an authoring tool for creating rich, interactive learning resources. It builds on the extensive experience of the Centre for Excellence in Teaching and Learning (CETL) in Reusable Learning Objects.

There are many definitions of learning objects. However, in our approach, learning objects are focused on one clear learning goal or objective. They are designed to be a) pedagogically effective, and b) reusable. Our learning objects normally incorporate the use of interactive multimedia to create a rich, effective learning experience. Examples of these rich multimedia learning objects may be found on the Website for the Centre for Excellence in Teaching and Learning in Reusable Learning Objects. [http://www.rlo-cetl.ac.uk]

The traditional approach to the reuse of learning objects has been to separate content from context in order to make the content reusable. However, it is not content but the quality of the learning design that is most important for effective learning. The generative learning object (GLO) approach thus inverts the traditional approach. It extracts successful pedagogical designs and makes these the basis for reuse. These designs are built into an authoring tool: GLO Maker. A teacher can then add content to produce learning objects based on successful designs to meet their specific needs and preferences.

*The purpose of the GLO Maker authoring tool is to empower teachers, and other users, to develop highly adaptable multimedia learning objects. The authoring process is design driven. The tool has two major parts: a **Planner** where the basic 'storyline' of the learning design is constructed, and a **Designer** where the screens are created based on flexible templates. You can use the built-in design patterns to structure your learning object, or you can use 'freestyle' mode to create your own design. All the designs are 'executable' – they enable you to directly create multimedia learning objects that will run on the Web or in a Managed Learning Environment, such as Moodle or Blackboard."* (GloMaker.org)

GLOMaker as a persuasive technology

In the process of exploring GLOMaker from a persuasive design perspective, each of the essential interfaces were defined and visualized in a GLO-Maker Flow-chart which is roughly illustrated below:

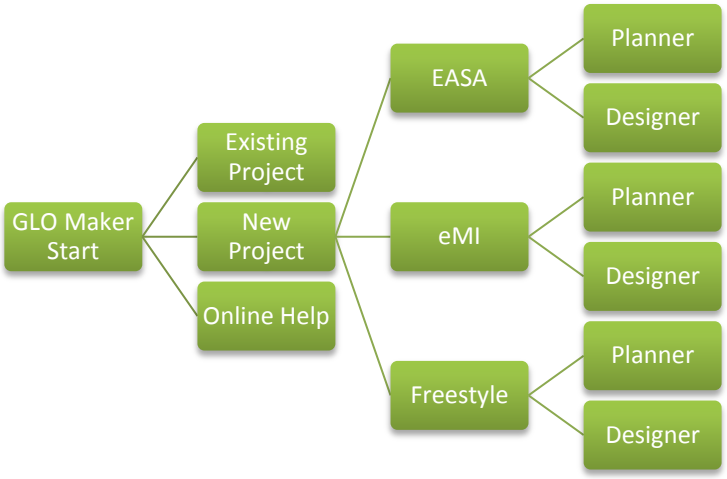


Figure 4 - Flowchart visualizing the GLOMaker

In practice, the Planner and the Designer are identical, regardless if they are approached from the path of an *Existing Project*, a *New Project* or *Freestyle*. However, as they show significant differences in content, depending on the selected paths, they are visualized and approached as individual elements in the flowchart. In the analysis, findings in these elements are presented and discussed collectively.

The Flowchart serves two primary objectives beyond providing an overview of GLOMaker:

1. It enables us to identify persuasive principles such as tunnelling and reduction in the architectural patterns of the program
2. It supplies the structure of the following analysis of the individual GLOMaker Interfaces, enabling us to identify and distinguish the areas in which the different levels of persuasion overlaps

Each element was analysed individually, but with consideration to its position in the flowchart. Thereby, individual persuasive principles could be identified in consideration of the context in which it is applied. Context in this sense refers not only to the entirety of GLOMaker as a tool for designing learning objects, but also to more specific areas of functionality within the program.

In practice, all observations made when analysing the individual elements, were entered into the following scheme:

Element (Enter Screenshot)	**Persuasive Principle Analysis**			
Level	**Form**	**Content**	**Comment**	**Suggestion**
1				

Field explanation:

- ***Form*** refers to the specific persuasive principles identified in the selected element
- ***Content*** refers to the content of the element and does as such support the understanding of the context in which the persuasive principle is applied
- ***Comment*** allows us the space to make general comments on the specific element and its content. Also in relation to the overall context of GLOMaker
- ***Suggestion*** provides us with the space to make (and thus remember) immediate suggestions concerning the element in question

Once all elements of the flow-chart are analysed, we expect to be able to identify not only which persuasive principles have already been implemented, but also any immediate patterns concerning applications of principles in general and in consideration of the individual levels of persuasion. In other words, we expect to be able to identify if we already experience particular patterns of persuasive principles, depending on the level of persuasion.

Observations and reflections concerning GLOMaker architecture

In the first part of the analysis of GLOMaker, focus was directed towards the overall structure of the tool. The persuasive principles identified in this part of the analysis, were primarily of relevance to the first level of persuasion; Designer → Teacher, as students are never influenced directly by GLOMaker, but by the Learning Objects created with it.

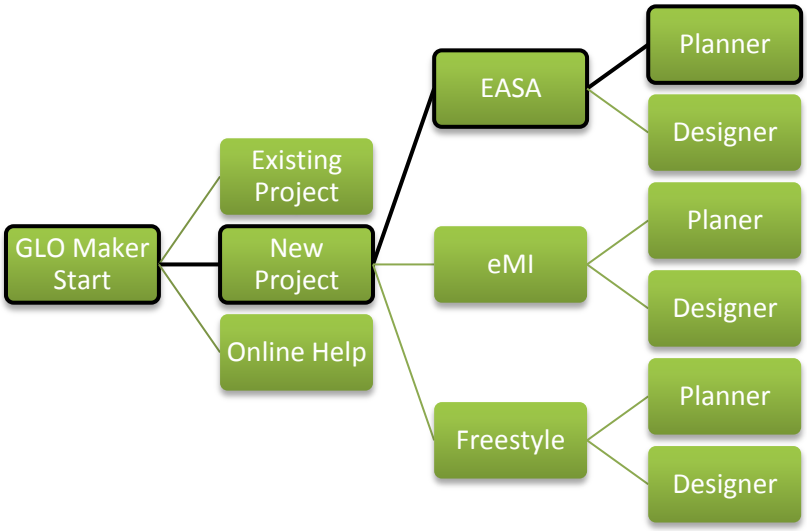


Figure 5 - Flowchart overview of GLOMaker and visualization of tunnelling principle

The visualization of GLOMaker as a flowchart enabled the identification of two persuasive principles of the Functional Triad tool category; reduction and tunnelling.

Reduction was identified in the simplicity of GLOMaker, where focus is placed on the tasks to be performed (planning and designing learning objects), without the presence of disturbing or non-relevant elements in the design. Furthermore, reduction is identified in the reduced options while using GLOMaker, and in the very few steps which need to be taken in order to get from the start of the program to the needed element. An example could be the steps from *GLOMaker Start* to the *Planner*, which is highlighted as a black path in Figure 2.

The black path in Figure 2, also visualizes one application of the persuasive principle of tunnelling. In order for the user to actually get from *GLOMaker Start* to the *Planner*, there are distinctive unavoidable steps which must be taken, during which the user can be influenced by selected input.

The reduction principle serves as a general motivating factor in the use of technologies. According to Fogg this can be related to psychological and economic theories which suggest that humans seek to minimize costs and maximize gains when deciding upon specific actions (Fogg 2003:33). The principle however, is also a well-known phenomenon in the humanistic traditions which define the approach to Persuasive Technology taken at Aalborg University. In classical logic, Aristotle introduces syllogisms to reduce the complexity of logical argumentation, and in rhetoric the preparatory concepts inventio and dispositio emphasize the importance of reducing the material to present, in order to present a given argument in the most effect full way.

As such, the *Reduction* principle becomes part of the foundation for the second identified principle; *tunnelling.* When creating a tunnel in a program, designers make specific choices concerning the elements which influence the user whilst completing the tunnel, and as such, this principle is essentially important, when wanting the user to make specific choices whilst using a program.

In relation to GLOMaker, this appears to be of significance if for instance the intention is to persuade the teachers to apply specific pedagogical patterns when teaching a specific topic. In continuation, decisions must be made concerning the extent in which the user should be able to change or exit the tunnels created in the program.

Observations and reflections concerning individual GLOMaker elements

Subsequent to the analysis of the architectural structure of GLOMaker, each of the different elements within GLOMaker were analysed in order to determine the use of persuasive principles within the system. In practice, the analysis followed the steps which a teacher would follow in order to develop a learning object, starting with the GLOMaker start page and proceeding through the steps of planning and designing an actual learning object.

Persuasive Principle	**Level 1 (Designer → Teacher)**
Reduction	X
Tunnelling	X
Tailoring	X
Suggestion	X
Self-Monitoring	
Surveillance	
Conditioning	
Simulation	
Social Signals - Verbal	X
Social Signals – Visual (Attractiveness)	

As visualized in Table 1, the analysis showed that GLOMaker already applied a selection of persuasive principles at Level 1. It is notable that the dominant persuasive principles are ones which often serve a usability purpose within a design; whereas the principles which have not applied in GLOMaker tend to serve a more distinct persuasive purpose.

GLO's as Persuasive technologies

Whilst the first part of the GLOMaker analysis explored the actual GLOMaker tool from a persuasive design perspective, this second part was focused on the persuasive potential of the GLOs which are created by GLOMaker. As previously described, the tool itself must be designed to motivate teachers to use the tool in specific ways in order for GLOs to become persuasive, however the GLOs themselves represent what may be considered the chore concept of interest in PLOT – the potential persuasive learning object.

Figure 9 - Learning Journey front page

For this second part of the analysis, the persuasive perspective was placed upon a specific example of GLOs called Learning Journeys (http://hermes.uwl.ac.uk/learnerjourney/index.html). Learning Journeys consist of three primary learning concepts, which each consist of a number of GLOs. The overall intention of the Learning Journeys is to help students "*prepare for successful academic study*".

Making the intention clear from the very beginning is beneficial not only in relation to persuasive design, but also to CA. From a PD perspective, openness concerning the persuasive intention is one of the aspects which helps ensure that the technology remains persuasive rather than being manipulative or deceptive, and when considering the notion of CA, knowledge regarding the intention of the lecture, class or learning object is to some extent a requisite for sharing the responsibility of the outcome. – Students cannot take responsibility for learning if they don't know what is expected from them and their engagement in the learning experience.

In consideration of the close ties between persuasion and rhetoric [17, 31], the name 'Learning Journeys' may be considered the first persuasive element of this group of learning object. Whilst 'learning' provides the users with direct information about the content of the learning objects, 'journey' connotes notions of travelling and experiencing. These connoted concepts may be related not only to the temporal aspect of completing an academic education, but also to the acquisition of knowledge which is most often the result of achieving an academic degree. Most importantly however 'journey', whether this is related to academic studies which the students are about to begin, or simply the completion of the learning objects within the system, may connote the impression that the task which is about to begin, is something which will be both fun and challenging.

Observations and reflections regarding GLO's as Persuasive technologies

The analysis of Learning Journeys as persuasive technologies showed that not only did the learning objects draw upon persuasive principles such as reduction, tunneling and suggestion. They also proved to be attractive and intuitive to apply. Both qualities which are regarded highly not only by Fogg, but also in classical rhetoric where the Elocutio phase not only refer to the appropriate way to present material, but also the most pleasing.

However, the analysis of Learning journeys also shed light upon the perhaps primary disadvantage of GLO's as persuasive technologies, namely the lack of ways in which students may interact with the learning material. Most of the GLO's analysed consisted of 4-6 slides primarily containing short texts and video clips, and only very few examples of interactive slides where identified. In consideration of the definition of persuasive technology which refers specifically to interactive technologies, as well as the notion of constructive alignment which emphasizes that students learn by doing, the further development of PLOTMaker should give careful consideration to ways of making GLOs far more interactive.

3ET in a persuasive technology perspective

Introduction to 3ET

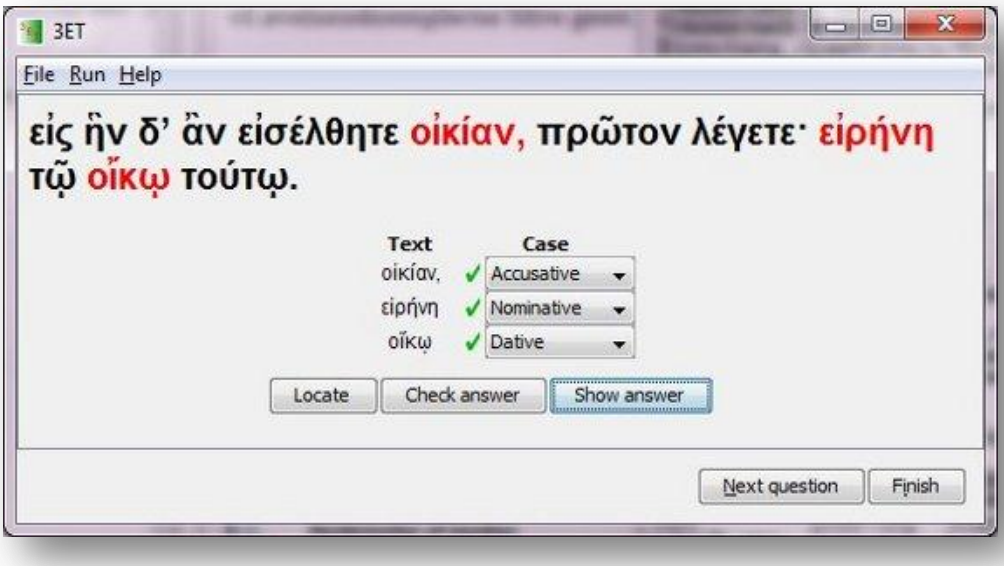
The Ezer Emdros-based Exercise Tool, or 3ET, is a tool designed to empower learners to take control over their own grammar drills as they study texts in a particular language. In a project coordinated by Nicolai Winther-Nielsen, it was programmed by Claus Tøndering (2009), and hence the name Ezer from his consult company.[1] The 3ET also contains the name Emdros which is the trademark of an open source database management system exhaustively described in the dissertation of Ulrik Sandborg-Petersen (2008), who created this particular system for storage and retrieval of texts and linguistic data.[2] The 3ET in this sense is a database application supporting grammar exercises created from texts.

In short, 3ET is a computer program that automatically generates grammar questions about a foreign language.

- *If you are studying Greek or Hebrew, you can use 3ET to generate questions for training your knowledge of the grammar of the language.*
- *If you teach Greek or Hebrew, you can use 3ET to generate quizzes to test your students' knowledge.*

Based on requests from the teacher or the student, 3ET selects random sentences from the Hebrew or Greek Bible and poses grammatical questions to the student.

An exercise in Greek noun cases may look like this:



The exercises that 3ET generates can either be executed directly in the program or exported as quiz questions to teaching portals such as Moodle.

[1] See http://www.ezer.dk/3ET/index.php?lang=en
[2] See http://emdros.org/

3ET as a persuasive technology

Contrary to GLOMaker which enables teachers to create learning objects based on the learning material they wish to present to their students, the 3ET automatically generates grammar questions, based on the content of a given database. As such 3ET does not autonomously facilitate the previously mentioned Designer → Teacher level of persuasion, but focuses solely on the learner's perspective. As a result, the analysis of 3ET as a persuasive technology, placed more focus on the steps required when downloading and installing the technology, followed by reflections regarding the actual use of 3ET. Besides from the referenced analysis of the 3ET, the program was also submitted to a light version of a "speak aloud" trial during the e-PLOT face 2 face meeting in Hradec Kralowe in November 2011 - thus providing the members of the consortium with a better understanding of the tool.

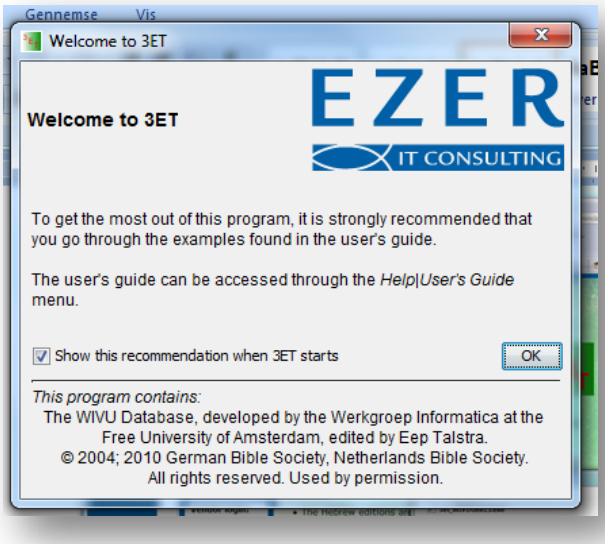


Figure 1 - 3ET Welcome screen

Whilst downloading and installing 3ET proved to be quite simple and require very little information from the user, the *Welcome screen* which appears once the program is started, visualized one of the primary weaknesses of 3ET. Although the design is kept simple and even boosts the credibility of the program by reference to a license given by permission from the world's foremost publisher of resources for the Biblical texts, the German Bible Society, the welcome screen also states that in order to gain most out of the program, the user should first go through the examples found in the user guide.

The importance of actually reading the manual was made even more apparent during the mentioned "think aloud" test I November 2011, when it became clear that it was almost impossible for the user to get to the actual learning material and complete the different quizzes, without having read the program manual in advance.

Once having initiated the program, the learning material presented is highly complex, and requires the full attention of the student. As such, the 3ET calls for a much higher level of usability, not only with regards to the system itself, but also in relation to the actual presentation of learning material. If the students have to

focus too much on how to use the technology, they will be less focused on what the system does, and as a result be less responsive to a system mediated persuasive initiative.

The importance of focusing on the usability of 3ET was stressed even further by the analysis of the tool provided for D.3.2, in which it was mentioned that experience had shown that users *"we also know that learners probably need to begin learning with this tool from their very first day in order learn how to plan practice building"*.

Whilst having students practice with the tool from 'day one', in order for them to get familiar with this particular approach to learning, may eventually improve the students impression of the technology and result in better feedback, it may not be a recommendable approach to creating a persuasive learning technology. In consideration of both Kairos and the fact that students usually have quite a lot of learning material to work their way through, the tools created in PLOT must be designed in a way which is intuitive and fun to use – even for students who are not expert PC users.

The grammar quizzes are primarily presented through a tunnel, in which the student is first presented with the topic, and an example of the specific quiz, followed by a screen in which the student can train the particular grammatical exercise. However, the tool does not provide any reminders about the objective of the specific exercise once it is entered, resulting in the student being lost if the previous steps have not been understood sufficiently before moving on. Various studies show that dead ends in systems (i.e. when being unable to complete a level in Angry Birds) are highly demotivating. The user will give a few attempts to complete the task, but eventually give up if no help is available. Suggestions to go backwards can be perceived as confirmation that one does not have the skills to complete a specific task, and do as such not help build motivation.

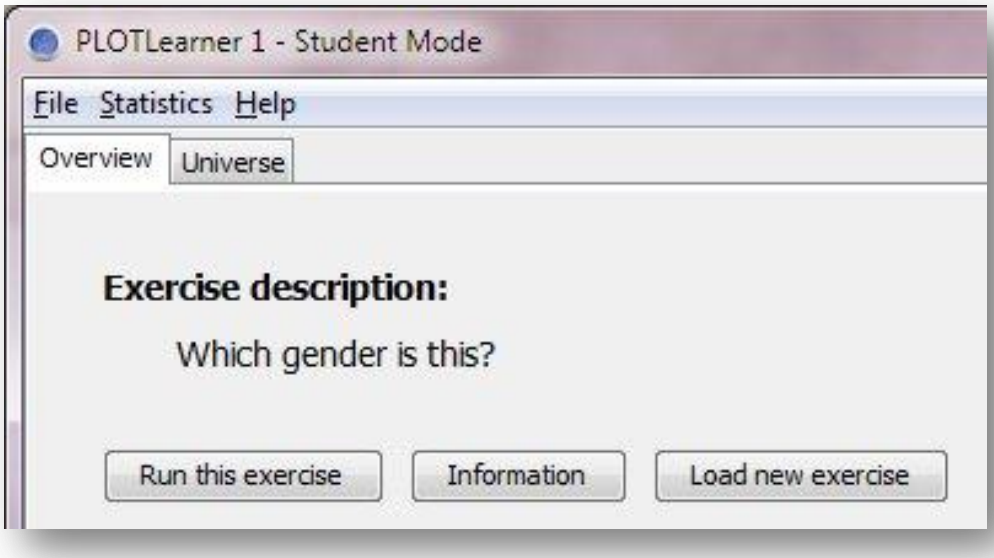


Figure 2 - Presentation of exercise objective

Figure 3 - Exercise question in 3ET

As a result, amongst the arias related to usability which calls for further development in 3ET, is a system embedded function which can assist and motivate the student at the right moment (Kairos) when something does not go as planned.

Challenges aside, 3ET does prove to have certain benefits in relation to persuasive learning. Unlike GLOMaker, 3ET focuses entirely on student activity, and the primary feature of the tool in which students advance to new grammatical exercises as they complete lighter levels, can reasonably be related to the notion of constructive alignment.

In relation to the tools ability to mediate a specific intention to the students, 3ET also has the benefit of targeting a very specific type of learning and learning material. Whilst exercises such as those related to grammar are essential to language learning, this particular type of student activity is far less relevant to other subjects. This was one of the perspectives which have become clear through the discussions which have taken place during WP3, as 3ET was originally meant to be tested in both the Biblical grammar work case and the Kaj Munk work case. However, having become more familiar with 3ET and GLOMaker, it became evident that the current version of 3ET does not provide activities which are immediately relevant to archival studies, as the material related to this particular subject calls for activities which motivate students to reflect and discuss rather than practice specific skills.

As such, the analysis of 3ET which has taken place through various activities in WP3 has helped support the argument that persuasive learning is dependent on designs which go beyond the specific technology, but also includes considerations regarding the context in which the technology is applied. Regardless of the persuasive potential of a technology, it will only be efficient if implemented in an appropriate context. These reflections concerning persuasive design and persuasive learning are elaborated further in the following section.

Persuasive Learning Designs

The previous sections of this report have provided an introduction to the theoretical foundation of Persuasive Learning Designs in e-PLOT, as well as an overview of the primary findings when analysing GLOMaker and 3ET from a persuasive design perspective.

In this third and final deliverable of WP3, the notion of practically applying persuasive design principles in the development of learning technologies (3ET and GLOMaker in particular), is developed and explored even further. Based on the theoretical foundation defined in D.3.1, as well as the results of the persuasive design analysis of GLOMaker and 3ET, this report provides an applicable definition of persuasive learning designs, as well as reflections and recommendations regarding the implementation of persuasive learning designs in WP4 and WP5.

The initial approach to defining a theoretical foundation for persuasive learning designs has helped elucidate the overlap between persuasive design and a constructive approach to learning. Likewise, the practical analysis of persuasive design principles in learning technologies has clarified that a selection of persuasive principles are already applied in GLOMaker and 3ET. The existence of a theoretical and practical overlap between persuasion and learning was expected, yet it does give reason for careful consideration regarding the definition of persuasive learning. As persuasive principles are already applied in learning it becomes necessary to also give careful consideration towards the contradictions between learning and persuasion, and the implications these may have not only for this specific project but also for research on Persuasive Learning on general. . In order to fully argue that persuasive design may be an asset to the more established field of digital learning, it must be clarified how we can distinguish between persuasive learning technologies, and enriched digital learning resources.

Distinguishing pedagogy from persuasion

The word Pedagogy stems from ancient Greek, in which *Paidagogos* was the privileged slave who ensured that children made it safely to school and were not distracted on the way there. The task was simply getting the child to school at any means, and part of the privilege of Paidagogos was the authorization to corporally punish the children if they did not go freely. Naturally the notion of pedagogy has developed since, however even modern pedagogy does to some extent focus on making students do something they actually don't want to do. Not many school children long to go back to school when they are off on vacation, and not many students involved in the E-PLOT case scenarios hold an intrinsic motivation to learn 'biblical Hebrew grammar', or 'how to handle dangerous chemicals'. The students' motivation to learn is linked to a more general desire to acquire an academic degree, or remain capable of holding a specific job position.

As such, pedagogy may in some ways conflict with the basic concept of persuasion, in the sense that persuasion by definition opposes manipulation, deception and force. Students may potentially be motivated by persuasive learning designs, but the process of getting the students to use the technologies may not be force-free but simply mandatory depending on how the testing and evaluation of the learning technologies is done. This gives reason to consider the entire learning context an essential element within persuasive learning, rather than focusing solely on the persuasive technology.

Persuasion at different levels

The necessity of considering persuasive design a correlation between a wider contextual perspective and a more specific persuasive initiative executed within the intended context, has already been addressed by several researchers, who approach persuasion from different angles. The novelty of the approach presented in this report, is the aim to unify these different perspectives, and argue that the correlation between a wider and a narrow perspective on persuasion is in fact a core element of persuasive design.

When initially introducing the concept of persuasive technologies, Fogg distinguished between Macrosuasion and Microsuasion as a way to explain and clarify the dynamics of persuasive technologies. According to Fogg, Persuasive Technologies have the ability to change attitudes and behaviours on two levels: macro and micro. The distinction between the two is important in terms of both analysis and development of persuasive designs in most computer technologies. The term Macrosuasion describes an overall persuasive intent of a technology, whilst Microsuasion refers to the use of Persuasive Design principles in technologies which do not necessarily have en overall persuasive goal [13].

Macrosuasion and Microsuasion can reasonably be related to the definition of Kairos as defined by Jette Hansen. Hansen specifies that the definitions of Kairos vary from narrow translations such as “particular point in time” and “specific circumstance”, to wider concepts such as “situation”, “occasion” and “opportunity”.

The narrow translation of Kairos is easily related to the rhetorical concept of Aptum, and is as such more applicable to the specific communicative situation. The wider definition however, contributes to the understanding of the ontology of rhetoric, as it clarifies the fields influence upon the world. Not only does rhetoric construct situations with an epistemological potential, it also shares a connection with the concept of doxa (unwritten rules or joint conviction), thereby relating Kairos to practical knowledge and experience, in contradiction to knowledge in the philosophical sense.

When considering the different meanings of Kairos in a Persuasive Design context, the narrow definition serves well in relation to specific design related choices, such as determining the appropriate time for initiating a persuasive strategy (i.e. triggering a specific behavior), an argument which has been raised by several researchers over the years [21, 22] The wider definition on the other hand, supports the argument that in order to successfully select and apply a persuasive principle to the design of a technological device, the designer must beforehand acquire a fundamental understanding of the context in which the device is to be applied, and use this knowledge to create a technology which will be appropriate to the given situation.

Finally, both Fogg’s reference to macrosuasion and microsuasion, and Hansen’s distinguishing between different definitions of Kairos, may be considered in relation the reflections concerning the intentions of the designer and the user as a requisite for successfully meeting a persuasive aim.

As previously stated, the designer will most often have a specific and quite complex intention with the design of a technology. This intention must to some extent be balanced towards the user’s intention behind applying the technology – an intention which is most likely influenced by exogenous factors.

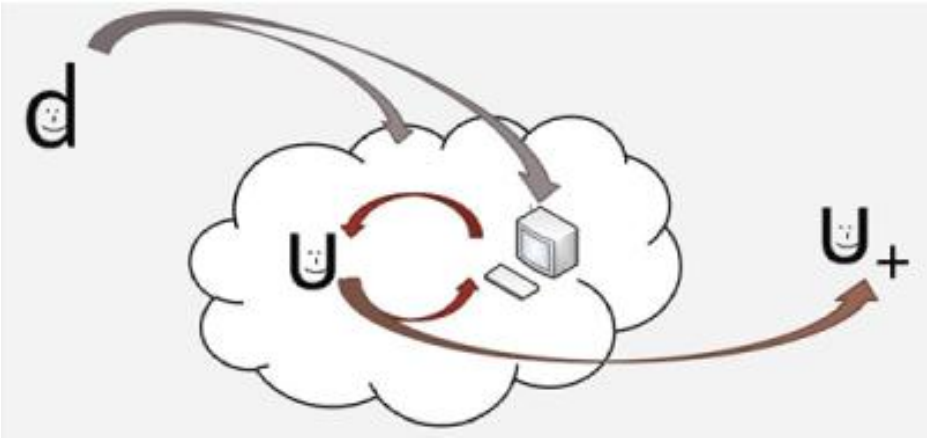


Figure 2 - The intention of a technological design concerns both the technology and the use context

In consideration of the designer most often having a specific use context in mind when developing a technology, and in acknowledgement that the correlation between the context and the technology influences the way the user perceives the technology and its intended use, it may reasonably be argued that both context and design of the specific technology must be taken into consideration if such technology is to facilitate a persuasive purpose. Failing to consider the context when designing the technology may draw the attention of the user towards the functionality of the technology, rather than targeting focus towards the persuasive intention which is to be mediated.

Defining persuasive design

The primary distinction between Fogg's definition of macrosuasion and microsuasion, related to the presented definition of Kairos and the reflections concerning the persuasive intention, is that whilst Fogg argues that microsuasion may be applied in technologies which holds no macrosuasive intention, the latter two perspectives insist that both the wider and the narrow perspective must be considered if the persuasive intention is to be fulfilled.

In consideration of the previously argued necessity of taking a more nuanced approach to persuasive design, than the definition of persuasive technologies which was developed by Fogg, these diversities gives reason to make a clear distinction between persuasive technology and persuasive design.

Based on the theoretical perspectives presented in the report, persuasive design is hereafter considered *the specific aim to (within a particular context), motivate a person to create, reinforce or change attitude and/or behavior regarding a specific topic.*

As such, persuasive design is considered a wider and more contextual concept, by which the designer aims to define a context, and within that context persuade one or more users. Within the intended context, persuasive technologies as they are defined by Fogg are acknowledged as a powerful mean to support the achievement of persuasive goals. In other words, within the intended context, the designer may draw upon various (non-technical as well as technological) elements, which support and facilitate the mediation of the persuasive intention.

Defining persuasive learning

Also in relation to constructive learning, the notion of considering a correlation between the learning context and the presentation of learning material has been discussed and emphasized through both classical rhetoric and modern approaches to OBL.

Biggs and Tang argue that one of the characteristics of a rich teaching/learning context is the setting of an appropriate motivational context [26]. The clarifications presented by Biggs and Tang, primarily relate to defining intended learning outcomes which the students can relate to, and to making it clear to students what they gain from achieving a specific learning outcome. However, the setting of an appropriate context might just as well refer to either shaping the context in a way which motivates the interest of specific topics or elements, or moving students into contexts which may facilitate the mediation of an intended learning outcome.

When considering persuasive design in relation to outcome based learning, it appears reasonable to draw a parallel between the persuasive intention and the intended learning outcome. The contribution of persuasive design then consists of particularly targeted intended outcome, aiming to not only present the selected learning material, but to present it in a way which motivates the students to reflect upon the material and preferably adjust attitudes or behaviors accordingly.

The contribution furthermore consists of motivating the teacher to not simply apply the setting which is provided, but to adjust the surroundings so that the context itself may facilitate the presentation. This perspective may appear abstract and hard to apply, but will be clarified through examples from the different PLOT work cases.

The defined approach to persuasive learning does appear to be beneficial to both of the PLOT learning technologies. Although both 3ET and GLOMaker are highly diverse, they share the characteristic that they may be applied by students regardless of physical location. In other words, they facilitate long distance learning, as well as being an element of support for traditional auditorium lectures, enabling students to immerse into learning material at different time and pace, depending on the intrinsic motivation of the individual student.

Persuasive learning in practice

In the following section, the notion of persuasive learning is exemplified by the four e-PLOT work cases. Primary focus is placed on specific ways of expanding the functionality of GLOMaker and 3ET in a way which makes them more applicable as persuasive learning technologies. The suggestions are based on both observations and reflections made by the partners involved in WP3, as well as on input provided by the case representatives in relation to their practical experience with the tools.

In support of the examples, the section first provides a contextual case description of each of the four cases. The descriptions are based on the previously mentioned Inspiration Card Workshop which was held during the Euro PLOT consortium meeting on May 10th and 11th 2011.

Contextual Case Descriptions

Inspiration Card Workshop – Considerations and Expectations

The PLOT consortium consists of designers, developers, experts in learning and in persuasive design, as well as representatives from the four project work cases. As such, the partner group consists of both technical experts and members with little or no technical proficiency. Within the development process, this causes some classical difficulties in relation to common language and common understanding of the work process. Each work case represents different learning material and different challenges, and do as a result require individual attention and investigation if the learning designs are to comply with not only learning theory but also with the notion of persuasive technologies and persuasive design.

The contextual case descriptions are based on the results of the previously described Inspiration Card Workshop which was held at the Face 2 face meeting in Aalborg I May 2011. The members of the consortium where divided into two groups, which each had case representatives from four cases. Supported by the inspiration cards, each of the cases were explained and discussed. Finally, as a productive and creative outcome of the workshop, each case in corporation with other members of the PLOT consortium, produced a poster which described one of the challenges they were facing, and a suggestion to its solution.

DHI Group (DHI), Denmark

"DHI is an independent international consulting and research organisation, which aims to advance technological development and competence within the fields of water, environment and health. DHI clients include: Industries, Consulting Engineers, Contractors, Infrastructure and Transportation Companies, Government Companies and Partnerships, Public Authorities, Development Organisations and Financial Institutions.

DHI offers a wide range of consulting services and leading edge technologies, software tools, environmental laboratories, and physical model test facilities as well as field surveys and monitoring programs. Designated as a not-for-profit organisation DHI is able to invest 25% of its human resources in research and development. Today we co-operate with universities in Denmark and abroad and are recognised globally for our innovation and expertise" [33]

In relation to the Euro PLOT project, DHI Group have specified their requirements in terms of a practical teaching scenario, in which case PLOT's may be a beneficial supplement to the existing types of teaching and communication. DHI Group is responsible for teaching researchers the appropriate and correct way to create new exposure scenarios, by combining existing chemical exposure scenarios from different substances.

DHI faces a challenge in terms of making vital teaching material appear relevant and motivating to the individual learners, and also in terms of designing teaching material which may facilitate different levels of difficulty.

In order to meet these challenges, it was suggested during the workshop that the DHI case might benefit greatly from different types of example simulations, as these would enable the students to gain firsthand experience with combining chemical substances, without imposing any real danger on anyone.

The workshop resulted in two specific examples of relevant simulation scenarios:

1. A disaster scenario during which the student would have to reflect upon why the disaster happened, who is responsible and what steps should have been taken to prevent the disaster.
2. A construction scenario in which the student could for instance combine appropriate chemicals to achieve an effect, or combine appropriate chemicals to minimize toxicity.

The notion of considering simulation as an approach to persuasive learning, not only incorporates elements from persuasive design (simulation is as mentioned a primary element in the functional triad), it also complies with the described notion of CA, as simulation scenarios would enable students to focus on the task they are intended to learn, rather than to concentrate on understanding the presentation of the theories behind the task.

Business Communication, University of Hradec Kralove

The UHK-case is primarily centred on the improvement of their long distance e-learning programmes, in the field of business-computing; e.g., information management, economics and management, and applied informatics. These courses are offered to adult students in the business sectors, whom are not using computers on a daily basis. The goal of the participation in the PLOT-project includes the improvement of their existing approach to include the persuasive design approach, introduced in this deliverable.

The main challenge of UHK is the users' limited experience with working with computers. This poses a series of considerations that the PLOT-consortium must investigate and address when designing the Persuasive Learning Designs. These considerations include, but are not limited to, the level of it-averseness within the student population and the level of confidence that the students have when operating these systems.

If the students are not prone to engage in using computers on their own, due to the perceived certainty that they will fail in their task, then this issue must be addressed and improved before successful learning is likely to occur.

This challenge could be met, by amplifying the use of the persuasive principle of Simulation in Persuasive Learning Designs. This would allow students to not only read about the subject, or watch instructional videos about how to operate it-systems, but experience it in a simulation environment that would allow added help or support features. In addition, the proven persuasive effect of Reward systems, could serve as an additional reinforcement of student self-confidence.

Kaj Munk research Centre, Aalborg University, Demark

"The Kaj Munk Research Center has the following main objectives:

1. *Securing Kaj Munk's archive for the future. The archive must be registered carefully and stored properly. At the same time, the archive is to be easily accessible.*
2. *Digitalizing the main parts of the archive and making them accessible on the Internet.*
3. *Promoting critical, interdisciplinary research on Kaj Munk and the society he lived in. The Center is to organize academic seminars.*
4. *Producing and encouraging publications about Munk and the society he lived in.*
5. *Increasing the general knowledge about Kaj Munk and the society he lived in by organizing seminars and lectures and by publishing articles.*

After Lise Munk's death in 1998, Jean Monnet Professor, Dr. Søren Dosenrode wanted to collect and acquire Kaj Munk's archive and establish a research center. He set up a board and a support group. After several years of negotiation with Kaj Munk's heirs and the Kaj Munk Forfatterrettigheder Aps. (a private limited company holding the copyrights of Kaj Munk), Søren Dosenrode was offered the archive for the price of DKK 1,5 million (about 200,000 Euro). The board contacted several political parties about the establishment of a Kaj Munk Research Center. This resulted in an appropriation of DKK 7 million (about 940,000 Euro) from the Danish Parliament in January 2005. This amount was granted to Aalborg University for the purchase of the archive and the establishment of a research center.
After the purchase of the archive was completed, the archive was transported to Aalborg University in May 2005. Work at the Research Center started in June 2005, and the Research Center was officially inaugurated on August 29, 2005." [34].

With regards to the Kaj Munk Research Centre, participating in the workshop help clarify that they as a case in the PLOT needed to clarify what they wanted to communicate to students, and what particular group of students they wish for the PLOT project to focus on. The research centre is involved in a number of teaching and communicative scenarios concerning both Kaj Munk himself, but also concerning the passing on of knowledge and understanding of his literary works.

Furthermore, the workshop discussion about the Kaj Munk case, inspired reflections concerning possible use of narratives in the development of persuasive learning objects, as the life and death of Kaj Munk includes a number of fascinating events which each could constitute the basis of a narrative based learning object. One example would be to let a learning object emerge from the search for knowledge about reasons why Kaj Munk was murdered. This would then lead to information about various situations during World War II, and also direct the students to the literary works of Kaj Munk.

Finally, the Kaj Munk case exemplified how persuasive learning objects may in some case benefit from being executed via mobile or even location aware systems, as several of Kaj Munk's literary works makes reference to specific physical locations in Denmark, and in particular to the area around Vedersø where Kaj Munk served as minister.

Amongst the advantages which are often mentioned in relation to learning objects, is that they enable the student to learn when they feel the most motivated to do so. This motivation within the students could be enhanced even more, if the students where located at the scene of the material presented in the learning object. For instance, the student might gain a greater understanding of the events that took place when Kaj Munk was murdered, if the learning object was executed via a mobile phone, whilst the student was located at the scene of the murder [10]

The notion of considering location aware systems in the design of persuasive learning objects may be related to the described notion of Kairos, which besides from considering the appropriate time for a persuasive action to take place also includes considerations regarding the location and manner of such.

The Copenhagen Lutheran School of Theology

The PLOT-case of The Copenhagen Lutheran School of Theology is a Copenhagen-based school of theology and as such focuses on teaching the Lutheran gospels and related teachings to a population of students; e.g., ancient Hebrew gospels. The aim of introducing Persuasive Learning Designs to the school curriculum is to better aid the present e-learning systems that focus on a quiz-based approach to teaching the Hebrew texts.

Teachers at the school have found, that students can be roughly divided into two groups; one that aim to work in the clergy, and another that seek the challenge of learning theology for no apparent reason. For both groups, the teachers face the challenge, that the students often meet the Hebrew texts with a lack of motivation. As such, the school seeks to improve this parameter by implementing the findings from the PLOT-project.

If the motivation for learning these texts is to be improved, this challenge could be met by presenting the content in a more appealing manner. In addition, the Place and Time should be considered, as to include the three-dimensional approach to the persuasive principle of Kairos. This could be done, by relating the text to specific locations that serve as a trigger for the text to appear on e.g. a smart phone or other devices. This would allow the students to investigate the texts at a time when they are relevant in time and place, in addition to being presented in a manner that is appealing and customized to the user.

Extending GLOMaker and 3ET into persuasive learning technologies

Based on the theoretical foundation and the analytical and practical experience with GLOMaker and 3ET, the following sections provide specific suggestions regarding ways of developing and improving the two tools, in order for them to extend their persuasive potential.

The basis of these recommendations is an understanding that whilst 3ET currently targets learning within a very narrow subject, GLOMaker needs to be extended in a way which facilitates that this tool may be applied in a large variety of learning context.

As a result, the recommendations regarding improvements to 3ET are primarily focused on improved usability and student support, whilst the suggestions for GLOMaker focus on improvements in students' interaction with the presented learning material, and on communicating "best practices" regarding the development and employment of learning objects in different contexts. As such, the suggestions for 3ET focuses entirely on improvements which will motivate students as they use the tool, whilst the suggestions for GLOMaker incorporate both the Designer → Teacher and the Teacher → Student level of persuasion.

It is important to stress that the suggestions presented may not be considered definitive solutions, but should be seen as basis for discussion within WP4 and 5, and that further development of the tools need also incorporate the feedback and suggestions made by the case representatives as they test and evaluate the coming prototypes of PLOTMaker and PLOTLearner.

GLOMaker as a persuasive learning technology

As previously mentioned, GLOMaker distinguishes itself from 3ET, by being a learning technology which may potentially facilitate a large variety of learning contexts regardless of subject and learning material. Based on the perception of the tool gained through WP3, further development of the tool should place a particular focus on motivating teachers to use the tool in the most appropriate way, and on developing more ways in which the students can interact with the learning material presented through the learning objects.

Persuading teachers to persuade students

As described in the executive summary, D.3.3 is defined as: : *"A set of Persuasive Learning Designs (PLDs) appropriately described in terms of theoretical background and expected areas of application, summarized as patterns. These will be used in WPs4 and 5 to guide the implementation of persuasion into the enhanced tools. They will also be made available publicly via the web portal."*

In light of the literary study on persuasion and learning, and in consideration of the distinctions between 3ET and GLOMaker, it soon became clear that developing persuasive learning designs and summarizing these as patterns which can be applied in both tools is simply not an option.

In GLOMaker, patterns refer to the pedagogical sequence by which a learning object is structured, such as the EASA pattern or the EMI pattern.

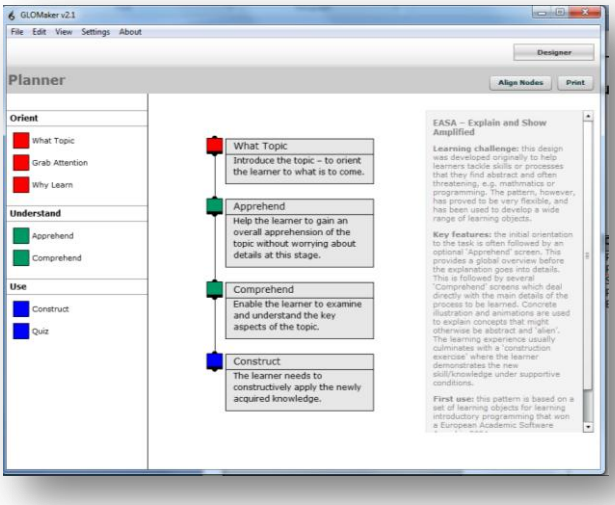


Figure 6 - Pedagogical pattern visualised in GLOMaker

The original aim of WP3 was to develop a number of patterns similar to the one visualized in Figure 6, which would draw on theories of both persuasion and pedagogy, and which could be implemented directly into GLOMaker. However, as persuasion and the fulfillment of a persuasive goal are dependent on the balance between the intended use context and the applied technology, this initial objective does not appear adequate. The persuasive learning potential of a learning object is not determined by the pedagogical patterns or the structure of the screen elements, but on whether it is implemented and

executed at the right time and place (Kairos) and on the students ability to interact with the learning material and in light of this interactive experience - taking place in a specific context, construct new knowledge and subsequently change attitude or behavior or both.

This taken into consideration, one of the challenges related to the development of PLOTMaker, is extending the technology to motivate the teachers to apply learning objects in a certain way – also referred to as the designer → teacher level of persuasion.

Currently when applying GLOMaker and choosing to create a new learning object, teachers are directed through a *tunneling* process, in which they first select a pedagogical pattern which can then be adjusted, then proceed to the design phase in which the different elements can be created much like one would design a slide in a power point presentation.

From a persuasive technology perspective, these steps show the benefit of applying both *tunneling* and *reduction* in the sense that choices are limited and the system clearly mediates what the teacher should do next. However, from a learning perspective, this type of tunnel places much focus on what material the teacher would like to present, and pay no attention to the eventual gain of the student. As such, the current steps required when developing a learning object, can be related not only to the often criticized "water fall approach" to learning [30] but also to Biggs and Tangs description of teachers at level 1, who place focus on their own actions and blame students if they do not learn from the material which is presented [26].

Theories on teaching, learning and pedagogy are vast, and just as students construct knowledge based on what they already know, most teachers are likely to approach a tool such as GLOMaker based on their existing experience with teaching as well as the pedagogical perspectives they commonly apply. However, as the theoretical cross field has established a benefit from considering the notion of constructive alignment in relation to persuasive learning, the system must be developed in a way in which the tunnel which teachers go through as they create learning objects, helps them move focus towards the gain of the students.

One approach could be to inform teachers about the basic perspectives on CA, and from an ethical point of view some information should be provided about the approach to teaching which is promoted through the system. However, from a persuasive learning design perspective, one way of motivating teachers to develop learning objects which focus on students' activities, is to develop a tunnel which ask the teachers the right questions and generates tailored patterns based on the input from teachers.

Tailored patterns

In consideration of theories on both persuasive design and learning, it may be beneficial if the development process in GLOMaker is changed from the current tunneling system, to a tunnel in which teachers once they have indicated that they wish to create a new learning object, are presented with questions which "force" them to focus on the students' outcome and how this may be achieved. This could be achieved through the following step:

- Teachers decide to create new learning object

- Teachers are asked to answer the question: *What is the intended learning outcome of this learning object?*
    - This question may require further explanation or refraining such as "W*hat is the student to gain from using this learning object?*"
- Once having stated the intended learning outcome of the learning object, the teacher will then be asked: What points must be made in order for this learning outcome to be achieved, and a list of text boxes should be available for answers.

The result of having completed the first three steps should then be visualized similar to the current patterns (Figure 6), only that the pattern is now headed by the intended learning outcome indicated by the teacher, and each element of the pattern represents a point which must be made in order for the intended outcome to be achieved.

As in the current version of GLOMaker, elements (points) can now be moved around until the teacher finds that the points will be made in a logical order. The primary goal of having the teachers customize their patterns is that it will also motivate them to reflect on order in which the points are to be made, thus linking the tunnel to notions of logical argumentation, rhetoric and also to notions of pedagogy which advocates that the shift from subject related logic to point based teaching, motivates the teacher to incorporate the students perspective as a lecture is being planned [35].

Once having decided on a pattern for the learning objects, the teacher can proceed to the designer phase, and now address each element based on the question *"How can this point be made clear to the student?"*

Some points may simply be best presented through an image, a text or a movie clip, but preferably the coming versions of PLOTMaker will include a variety of design solutions which enable the students to be active in recognizing a point made, for instance by interacting with the learning material or the surrounding context.

Challenges and considerations

Whilst changing the tunnel which guides the development of learning objects may influence the teacher's thoughts about what learning material is presented and how, this suggestion does still hold some challenges.

One of the characteristics of learning objects is that they are self-contained context independent learning resources which may be used and reused in a variety of ways. This is a challenge in relation to persuasive learning (which is context dependent), but is none the less a feature which should be preserved through the development of the tool.

In order for learning objects to remain context independent, the intended learning outcome of each object should to some extent be point oriented in the same way as the individual elements of each object – only at a higher level.

An example of this was seen in the Learning journeys which constituted the basis of the previously described analysis of GLOs.

Figure 7 - learning Journey front page

When visiting the learning journey website, the overall intended learning outcome is clearly stated in the welcome text – namely to help students prepare for successful academic study.

Making the intention clear from the very beginning is beneficial not only in relation to persuasive design, but also to CA. From a PD perspective, openness concerning the persuasive intention is one of the aspects which helps ensure that the technology remains persuasive rather than being manipulative or deceptive, and when considering the notion of CA, knowledge regarding the intention of the lecture, class or learning object is to some extent a requisite for sharing the responsibility of the outcome. – Students cannot take responsibility for learning if they don't know what is expected from them and their engagement in the learning experience.

From the front page, students are able to choose between three different journeys.

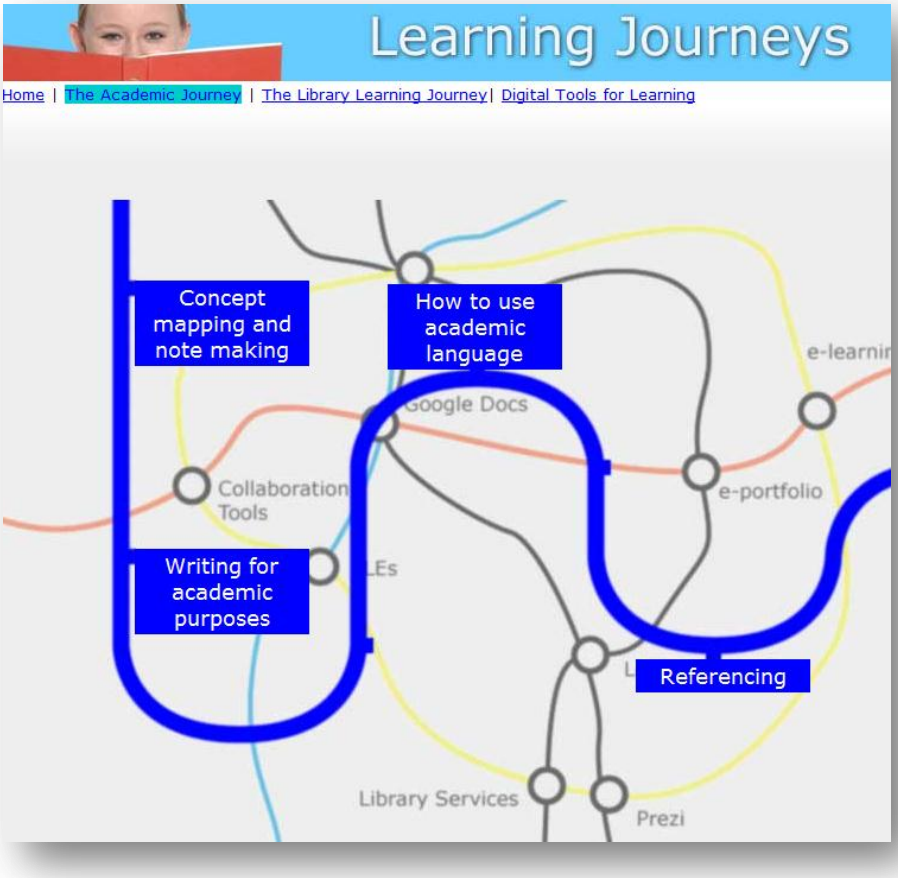


Figure 8 - Learning Journey - The academic journey

When entering each of the learning journeys, the content of the journeys are visualized by a map with a highlighted route and a selection of stops before continuing onwards, out of the illustrated map. The image of a map – and even more so the highlighted route, which is visualized in the first screen of the academic journey, contributes to the previously mentioned connotations of 'journey', as this first screen not only visualizes the different steps which must be taken within the academic journey, but also illustrates the order in which the steps should be taken.

The notion of clarifying a specific order in which the journey should be completed, can as previously mentioned be linked to notions of logic and rhetoric, but it also helps the student understand what is expected, thus relating the presentation of learning objects to the notion of CA and the considerations regarding a mutual responsibility between the teacher and the student.

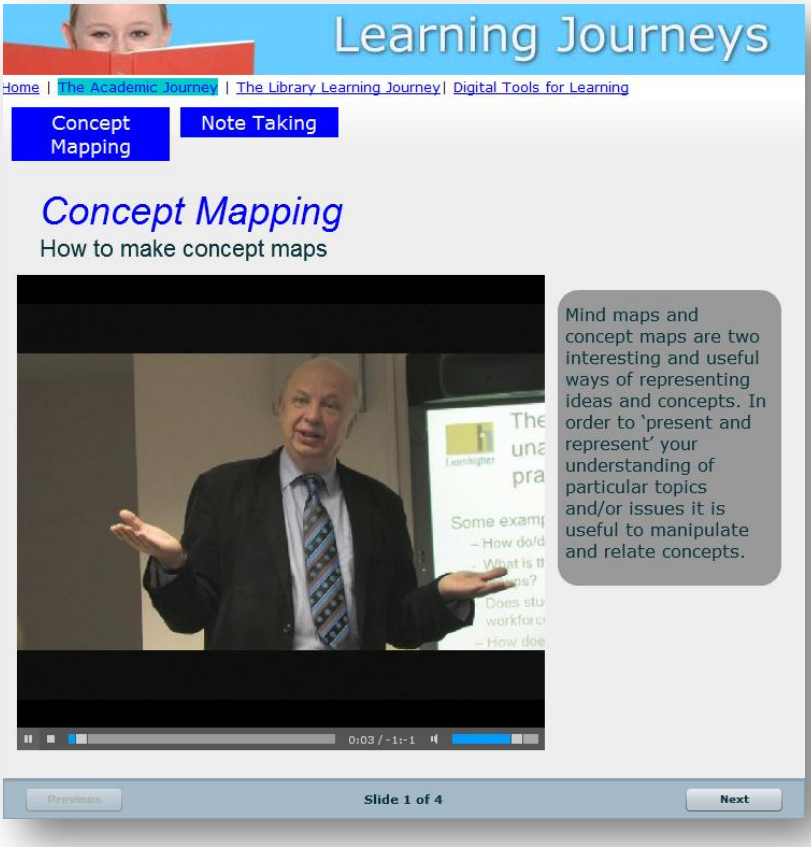


Figure 9 - Learning journey - GLO on concept mapping

The important thing to notice at this point is that the individual learning objects are designed to present specific points which are linked to one or more layers of intended learning outcomes. In this case, the GLO on concept mapping simply presents one point which the developers consider important for students who are to embark on an academic journey.

In order to exemplify this in relation to the e-PLOT cases, attention is drawn towards the Kaj Munk case, which from the very beginning has proven to be multifaceted and very complex. One of their goals is to teach students about the literary works of Kaj Munk, and in order to do so, teachers may be eager to create a learning object which presents one of Kaj Munk's famous playwrights, *The Word*.

Presenting an entire play in one learning object is likely to be too heavy and complex to truly motivate the students to reflect on the presented material, whereas creating a series of learning objects which present various important points made in *The word*, may help to not only simplify the presentation for the students, but also ensure that the learning object remains reusable in other contexts. For instance, one important point to draw from *The word* and present through a learning object could be *"How does Johannes (one of the main characters of the play) respond to the notion of resurrection?"* The intended learning outcome of the object could be that "when having completed this learning object the student must be able to identify and reflect upon Johannes perspective on resurrection", and the individual elements within the learning object should be focused on identification and reflection.

Thereby, the teacher would have created a learning object which could be relevant not only when teaching students about Kaj Munk, but also when teaching subjects such as theology or ethics, in which the ability to reflect on abstract topics are just as relevant, thereby preserving the characteristic of learning objects as being context independent.

Should the considerations regarding context independency be considered important as PLOTMaker is developed, ways of mediating the importance of different levels of intended learning outcomes through the system must be considered. Much can be solved through designing tunnels which motivate the teacher to design a learning object in consideration of specific things, but best practice regarding the use and implementation of learning objects must also be communicated if the designed learning objects are to be considered persuasive.

User defined branching

Learning objects may benefit from system branching which enables the user to choose between different paths whilst completing a learning object. The intended learning outcome will remain the same, but the events which lead towards this outcome may to some extent be defined by the user.

The notion of user defined branching is inspired by role-play game books such as Fighting Fantasy which was originally introduced by Ian Livingstone and Steve Jackson. In these books, the reader takes control of the story's protagonist, by making choices throughout the story that affect the final outcome.

Related design features

In order for the user to make qualified decisions regarding proceeding steps within the system, user defined branching should be closely related to system feedback and suggestion.

Theoretical foundation

This particular type of branching can be linked to the persuasive principle of tunneling, in which a user is lead through a predefined sequence of actions or events. Tunneling is defined as a primary task support by Oinas-Kukkonen et al [36], and both the PSD model and Fogg's original description of the principle, emphasize that the user gives up a level of self-determination when entering a tunnel, thus allowing oneself to be exposed to numerous persuasive activities.

By applying tunneling in a way which enables the user to choose directions through the learning object, self-determination is to some extent returned to the user. This is beneficial not only from an ethical perspective, in which mutual responsibility can only be achieved if the user is given the opportunity to actively influence the process, but also from a learning perspective if the user is to take responsibility for own learning.

Biggs and Tang argue that learning is a mutual responsibility between the teacher and the student, and that the actual learning is dependent on not only the teacher's ability to present learning material in an interesting way, but also the student's ability to actively engage in the learning experience. The notion of user defined branching within the system, will provide students with the option to actively influence how learning material is presented, and what activities should be included in the process of reaching the intended learning outcome.

Finally, the notion of user defined branching may be linked to the associationist perspective on learning pedagogy, in which learning takes place through the gradual building of patterns of associations and skill components. Through this approach to system branching, the user is given the opportunity to explore specific segments of the contained learning material, and not move on to new material before feeling confident about the initial segment. Furthermore, user defined branching enables the user to make an individual choice regarding the order in which learning material is presented, rather than leaving this entirely up to the teacher/learning object designer.

Case based example

One way of presenting learning material regarding the Kaj Munk case, could be to ask students to investigate why Kaj Munk was murdered.

The intended learning outcome would be for the students to gain an understanding of the complexity of Kaj Munk's resistance towards Nazi troops during WWII and in particular during the occupation of Denmark.

Within the learning object, the user should have access to learning material and activities pointing towards different aspects of Kaj Munk's life which are somehow related to the question concerning the murder of Kaj Munk. This would involve access to the Emdros database in which all literary work of Kaj Munk is contained, as well as access to historical facts concerning WWII and Kaj Munk's life and work.

By applying branching to the overall tunnel in which the student is introduced to these different aspects, the student will be able to decide the order in which material should be presented, and also determine which elements are most important to the overall goal. Depending on the design of the particular learning object, this will motivate the user to reflect more upon the learning material, rather than simply search the different elements of the object in order to find the correct answer.

Enabling students to interact with learning material

The third and final reflection to be brought up in relation to GLOMaker is the importance of enabling the students to interact with the learning material.

Both the definition of persuasive technology and the notion of CA emphasize that the achievement of the intended outcome (and or learning) is dependent on the actions of the user. By definition, persuasive technologies are interactive, and the essence of CA is that good efficient teaching focuses on what the students do.

An often made critique of learning objects, which also apply to GLOs, is that they represent an approach to learning in which knowledge is presented to the students through computer mediation, and students are expected to learn, simply by working their way through the learning object [30]. If the learning objects created with PLOTMaker are to be considered elements in a persuasive learning design, it is a necessity that students are enabled to actively engage in the learning process and to some extent interact with the learning material.

One possibility which has been discussed during the process of WP3 is the concept of customized learning objects, in which part of the content is generated by the students as they work with the learning objects.

The idea is inspired by classic sticker books, where the user (often a child) is given a book, with texts and colors – but with grey areas or blanks which still needs to be filled in. The user can then collect stickers in order to complete the pages of the book.

Applying the basic idea of the sticker book to learning objects, would result in the teacher generating the structure (deciding on the important points), but that part of the content would be up to the student. For instance, the teacher could provide a text about a specific object relevant to the work done within the DHI work case, and the student would then have to supply the illustration to support the text.

The benefit of the sticker book idea is that it is applicable not only to students who are working at desktop computers, but also to those who apply mobile devices when executing a learning object. As such, students related to the Kaj Munk case could be asked to supply the illustration to support a given text, either by locating an suitable image online, or by generating the image themselves with cameras on their mobile phones – for instance when visiting Kaj Munk's vicarage in Vedersø. Furthermore, the sticker book functionality would be applicable regardless of context (outdoor and indoor) as the activity of the student would be related to the learning material rather than the location, such as the case would be if learning objects were linked entirely to specific locations such as a GPS waypoint.

From a theoretical perspective, user generated content in learning objects would draw upon both the notion of CA but also be linked directly to currently unapplied principles from Fogg's original persuasive technology framework, namely the principle of *tailoring*, which is commonly described as the principle of a site or a program presenting relevant content to individual users or user groups [13].

Originally, tailoring referred to a technology which adjusts the presented content to fit the individual user – in which case user information had been provided in advance. However, the sticker book idea enables the individual learning objects to be persuasive in several ways to the same user, as they will first be motivational as the blanks are filled in [37], and again later on as they will represent a customized learning resource which the student which the student can include as a reference for future work. The primary benefit of the latter is that in accordance to Biggs and Tangs perspectives on learning, students are more likely to learn and remember based on their own actions – and as such, they are more likely to recollect learning material which they themselves have produced.

3ET as a persuasive learning technology

Whilst GLOMaker potentially targets a very wide range of learning context, and must be able to present a variety of learning material, 3ET distinguished itself by being a highly specialized tool which facilitates learning within a very narrow subject field. Practicing specific skills by repeating a specific type of exercises does not apply to many other subjects than language learning, but is within this particular field an important and highly efficient way for students to become familiar with the grammar of a foreign language.

The level of specialization which applies to 3ET is rather beneficial in relation to persuasive learning. The mediation of the persuasive intention is eased by the fact that the tool is unlikely to be applied in an unintended context, making it possible to place more focus on facilitating the learning activities which take place as the tool is applied.

The experiences gained through WP3, regarding the functionality and applicability of 3ET, has enlightened two areas which should be given strong consideration in WP5, namely improving the usability of the tool in relation to both the system and the interface, and the considerations regarding implementation of a support system for the learner – preferably one that will incorporate considerations regarding the notion of Kairos.

Improving usability

As previously described, 3ET already incorporates perspectives on learning which can be linked to CA. As the exercises are generated automatically by the system, focus is placed entirely on the student and the student's activities. As such, the learning perspective is not the area which requires primary attention in the further development of the tool.

However, both the analysis of 3ET which was originally included in D.3.2, and the "think aloud" test which was carried out during the e-PLOT face 2 face meeting in Hradec Kralowe in November 2011, showed that the usability of 3ET is lacking greatly – to an extent where it is likely to influence the mediation of the persuasive intention.

Experience shows that not only is the learning material presented in 3ET highly complex, but simply starting an exercise in 3ET also calls for the student's careful attention if the exercises are to be entered and completed in the manner and order in which they are intended by the teacher. 3ET does show much potential as a persuasive learning technology, but the system lacks intuitiveness, and many of the steps which are required prior to beginning an exercise session needs to be reduced so that the attention of the student can be maintained towards the intended learning outcome.

As a result, it is recommended that WP5 aims to improve and reduce the system-related steps which a student must take prior to actually beginning an exercise. With the intended outcome of applying the tool being to motive the students to practice and learn the grammatical structures of a foreign language, actions related to this specific goal should be the once in focus, and everything (or as much as possible) related to starting the program, retrieving the right exercise and getting to work should be atomized. Thereby the tool would draw even more on CA, as activities would be related directly to the intended learning outcome, and at the same time improve the persuasive potential of the tool by means of the persuasive principle of

reduction, by which activities which are not directly related to the intended outcome are simply reduced or removed by the system.

Another area related to the usability of 3ET, which calls for much improvement is the graphical interface of the tool.

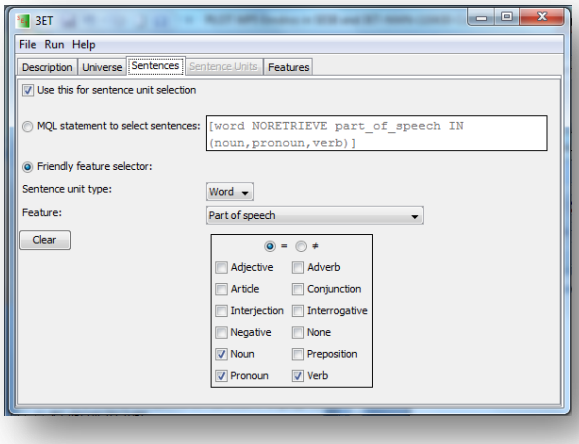


Figure 10 - 3ET exercise interface

The different screens in 3ET currently resemble well-known Windows applications, and it may be worth considering if this is the best visual representation of the exercises or if the working with 3ET might become more fun and perhaps even more intuitive if the visual design was changed drastically. Whilst some may feel comfort in recognizing windows application screens, they may actually be quite intimidating to others – as they often turn op when something isn't working. From a persuasive design perspective, the "Windows explorer look" provides the user with a lot of options but no suggestions and no guidance. At first glance there appears to be no tunnelling, no suggestion and very little reduction – making it very difficult to see that there is a specific intention behind the design.

The current design and the selection of tabs and pull down menus actually give the impression that the user is asked to respond to quite a few technical options while using the tool. This may not be beneficial as concentrating on the system rather than on the actual exercise may as mentioned influence the mediation and effect of the intended learning.

To some extent, the first step to motivating someone is to make the task which needs to be done look nice and easy. We like pretty food, nice furniture, beautiful flowers and we appreciate when other people take care of the hard work for us so that we get more time for what we find fun and interesting. This also applies to teaching and learning. Often it seems easier to read a journal article than to read an entire book – simply because there are fewer pages, and if we must read a book, we like the ones with nice pictures, good layout and nice visualizations.

These perspectives can theoretically be linked to notions of attractiveness and likability [9, 13], both of which have been described as vital not only in relation to the mediation of a persuasive intention, but also

to the credibility of the system, which at another level is equally important when wanting to efficiently persuade someone.

Supporting the student whilst working on exercises

The learning material presented in 3ET is highly complex, regardless of the language being learned, and as a result, 3ET will benefit greatly from a support system which can assist and motivate the student as exercises are being completed.

Amongst the problems which were noticed as 3ET was being presented and discussed, is the previously described order in which instructions are given to the user. In the current version of 3ET, the user is presented with a grammatical challenge (possibly supported by an example), but once the student enters the actual exercise, there are no reminders provided regarding what to do and how to do it.

First step towards a solution for this particular problem is naturally to ensure that a reminder regarding the intention behind a specific exercise is present on the exercise screen. However, 3ET may motivate the students even further, if the tool becomes able to provide user feedback based on the actions of the user. If the student completes an exercise without any struggle, the system should be able to offer praise or possibly even rewards, and even more importantly, if the student struggles or fail to complete an exercise, the system can provide support in terms of reminders, help or relevant examples.

The notion of a support system such as the one suggested, is closely linked to the perspectives of temporal logic and branching time which were described in the theoretical foundation of persuasive learning designs, but it may also be related to both the notion of Kairos and the persuasive principles which according to Fogg enable the system to be perceived as a social actor. Branching time and Kairos would be essential perspectives when determining what type of feedback to provide at a given moment, and the notion of giving feedback which is closely related to the specific situation of the student, can be linked to the persuasive principle of tailoring, as well as being an example of social signals such as praise.

If it is decided within WP5 to extend 3ET with a support system, it should be emphasized that the system should focus on *support* rather than competition. Whilst aspects of competition - such as scoreboards, enable the students to self-monitor progress, it may be questioned whether or not such an approach is appropriate in a learning context. One of the disadvantages of competition is that it is likely to also enlighten when the student does poorly, without supplying this information with advice on how to improve the results. Negative feedback can be highly demotivating, and could impose the risk of the student simply losing interest in working with 3ET. – Much similar to users losing interest in simple games such as Angry birds, if they reach a level which they cannot complete, and are provided with no hints, help or ways out.

Consider the color scheme

As a final suggestion, it is advised that the developers in WP5 consider combining system feedback with the recommended redesign of the user interface, and while doing so give careful consideration to choices made with regards to colors.

Research performed at the technical university in Eindhoven has shown that users are highly likely to be influenced by the color combination red/green, whereas yellow/blue did not cause any noticeable reactions [38, 39].

Considerations regarding ambient persuasive feedback within 3ET may be highly beneficial, as support, praise and rewards can as such be delivered in more subtle ways than simple dialogue boxes. The feedback from the system can be considered part of the interface – for instance a progress bar which visualizes the students' progress without demanding too much attention. Thereby it would once again be possible to ensure that the features of the system do not outshine the primary message to be mediated – namely the intended persuasive learning outcome.

References

1. Gram-Hansen, S.B. *Towards an Approach to Ethics and HCI Development, based on Løgstrup's Ideas*. in *Interact*. 2009. Uppsala: Springer.
2. Gram-Hansen, S.B. *Persuasion, Ethics and Context Awareness - Towards a Platform for Persuasive Design founded in the Notion of Kairos*. in *Persuasive 2010*. 2010. Copenhagen: University of Oulu. Department of Information Processing Science. Series A, Research Papers. Oulun Yliopisto Tietojenkasittelyopin Laitos.
3. Davis, J., *Design methods for ethical persuasive computing*, in *Proceedings of the 4th International Conference on Persuasive Technology*. 2009, ACM: Claremont, California.
4. Albrechtslund, A., *Ethics and Technology Design.* Ethics and Information Technology, 2007. **9**(1): p. 63-72.
5. Davis, J., *Generating Directions for Persuasive Technology Design with the Inspiration Card Workshop*, in *Persuasive Technology*, T.a.P.H.a.H.O.-K. Ploug, Editor. 2010, Springer Berlin / Heidelberg. p. 262-273.
6. Plough, T., et al., *Report on the Ethics of HANDS*. 2010, Aalborg university.
7. Gram-Hansen, S.B., H. Schärfe, and J.V. Dinesen, *Towards a Context Oriented Approach to Ethical Evaluation of Interactive Technologies*. 2011, Unpublished.
8. Halskov, K. and P. Dalsgaard, *Inspiration card workshops*, in *Proceedings of the 6th conference on Designing Interactive systems*. 2006, ACM: University Park, PA, USA.
9. Lockton, D., D. Harrison, and N. Stanton. *Persuasive Technology in a Wider Context* in *Persuasive 2008*. 2008. Oulu Finland: Springer Berlin / Heidelberg.
10. Dinesen, J.V., *I Praktik på PLOT*, in *Department of Psychology and Communication*. 2011, Aalborg University: Aalborg. p. 40.
11. Gram-Hansen, S.B., H. Schärfe, and J.V. Dinesen, *Plotting to Persuade - Exploring the theoretical cross field between Persuasion and Learning*, in *Persuasive Technology 2012*, M. Bang, Editor. 2012, Springer: Sweeden.
12. Fogg, B. *Persuasive Computers, Perspectives and research directions*. in *CHI*. 1998: ACM Press.
13. Fogg, B., *Persuasive Technology, Using Computers to change what we Think and Do*. 2003: Morgan Kaufmann Publishers.
14. Miller, G.R., *On Being Persuaded, Some Basic Distinctions*, in *The Persuasion Handbook, Developments in Theory and Practice*, J.P. Dillard and M. Pfau, Editors. 2002, Saga Publications: London.
15. Schärfe, H., *Persuasive Design*, in *Danskernes Akademi*. 2010, DR2.
16. Gram-Hansen, S.B. *Persuasive Everyware - Possibilities and Limitations*. in *WMSCI*. 2010. Orlando, Florida: IIIS.
17. Hasle, p.a.A.-K.K.C. *Classical Rhetoric and a Limit to Persuasion*. in *Persuasive Technology*. 2007. Palo Alto: Springer.
18. Billig, M., *Arguing and Thinking. A Rhetorical approach to social psychology*. 1996: Cambridge University Press.
19. Pertou, M. and S.D. Iversen, *Persuasive Design i Retorisk Perspektiv.* rhetorica Scandinavia, 2009. **46/50**: p. 15.
20. Hansen, J.B., *Den rette tale på det rette tidspunkt.* RetorikMagasinet, 2009. **74**.
21. Aagaard, M.a.P., Øhrstrøm and Lars, Moltsen. *It might be Kairos*. in *Persuasive 08*. 2008. Oulu Finland: Springer.
22. Glud, L.N. and J. Jespersen, Leth *Conceptual analysis of Kairos for Location-based mobile devices.* University of Oulu. Department of Information Processing Science. Series A, Research Papers, 2008: p. 17-21.
23. Øhrstrøm, P.a.P., Hasle, *Temporal Logic: From Ancient Ideas to Artificial Intelligence*. Studies in Linguistics and Philosophy. Vol. 57. 1995: Kluwer Academic Publichers.

24. Gram-Hansen, S.B., *Persuasive Everyware - Persuasive Design Funderet i Kairos*, in *Communication and Psycology*. 2010, Aalborg University: Aalborg. p. 88.
25. Løgstrup, K.E., *The Ethical Demand*. 1997: University of Notre Dame Press.
26. Biggs, J. and C. Tang, *Teaching for Quality Learning at University*. 3rd ed. 2007: Society for Research into Higher Education & Open University Press.
27. Laursen, P.F., *Didaktik og Kognition*. 1999: Gyldendalske Boghandel, Nordisk Forlag.
28. Allert, H., H. Drahief , and N. Wolfgang. *Meta-Level Category 'Role' in Metadata Standards for eLearning. Instructional Roles of Learning Objects.* in *COSIGN*. 2002.
29. Wiley, D.A., *Connecting learning objects to instructional design theory: A definition, a metaphor, and a taxonomy*, in *The Instructional Use of Learning Objects*. 2002.
30. Dalsgaard, C., *Åbne læringsressourcer - mod en sociokulturel teori om læringsressourcer*, in *Institut for Informations- og Medievidenskab, Humanistisk Fakultet*. 2007, Århus Universitet: Århus.
31. Gram-Hansen, S.B., H. Schärfe, and J.V. Dinesen, *Deliverable Report D.3.1 Persuasive Learning Design Framework*, AAU.DK, Editor. 2011: Aalborg.
32. Lykke, M. and J. Hyldegaard, *Fra overtalelse til bedre informationssøgning.* Biblioteksпressen, 2010. **1**: p. 22-26.
33. DHI. *DHI Group Homepage*. 2011; Available from: http://www.dhigroup.com.
34. Munk, K. *The Kaj Munk Research Centre*. 2011; Available from: http://www.kajmunk.hum.aau.dk/en.
35. Herskin, B., *Undervisningsteknik for universitetsundervisere*. 2001: Samfundslitteratur.
36. Oinas-Kukkonen, H.a.M.H. *A systematic Framework for Designing and Evaluating Persuasive Systems*. in *Persuasive 2008*. 2008. Finland: Springer.
37. Lockton, D.a.D., Harrison and Neville, Stanton. *Persuasive Technology in a Wider Context* in *Persuasive 2008*. 2008. Oulu Finland: Springer Berlin / Heidelberg.
38. Ham, J.a.C.M. *Ambient Persuasive Technology Needs Little Cognitive Effort: The Differential Effects of Cognitive Load on Lighting Feedback versus Factual Feedback* in *Persuasive 2010*. 2010. Copenhagen: Springer Verlag.
39. Ham, J., C. Midden, and F. Beute, *Can ambient persuasive technology persuade unconsciously?: using subliminal feedback to influence energy consumption ratings of household appliances*, in *Persuasive 2009*. 2009, ACM: Claremont, California.