The Medium, the Content, and the Performance: An Overview on Media-Based Learning

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ABSTRACT

This Paper argues that a correlation exists between the medium of instruction, students' performance, and the instructional content. Media-based learning is not necessarily more effective, simply because it uses a medium. Several variables exist that influence its success: the medium itself, its properties, production and consumption restraints; the content, and the way it can be presented in the context of a specific medium, and learners' cognitive styles. All these variables and more have to be taken into consideration, alone and interacting, in order to decide whether and where media-based learning is to be used, and where it might be counterproductive.

Key Words: Media-based learning, medium, content, performance

INTRODUCTION

Does media-based learning make sense?

In the early stages of media-based learning, Clark (1983), implied in a frequently mentioned article, that the instructional media probably does not have a decisive influence on the learning process.

BACKGROUND

The "Language Networks" project within the program "Lifelong Learning" of the German Federal-Länder-Commission for Educational Planning and Promotion Research was under the author's direction, and it investigated the advantages and problems of media-based language training. It soon became clear during the early stages of the literature review, that a final conception about media-based learning is more complex, including its verifiability, than generally assumed (Giessen, 2004).

Initially - and very broadly - the majority of the studies reviewed confirmed a performance imbalance between traditional and media-based learning. The studies involved were of a quantitative nature, and usually school classes or

groups of learners were compared. Here the socio-graphic composition of the groups, and the learning content were kept as identical as possible, so that the only altered variable was related to media-based instruction. In the context of these experimental studies, media-based instruction proved to be, in direct comparison with traditional classroom instruction, on average not worse than the conventional instruction methods – however, in general, not significantly better.

There were observations indicating that individual pupils can do better with media-based learning than with traditional instruction, while on the contrary, other learners had greater difficulties, got along not so well and even produced worse results with media-based learning than with traditional instruction. Accordingly, the experimental studies mentioned above (and being described in the next paragraphs with more detail) might hide a division of the pupils into those who profit from learning with the computer and others who did not get along so well with media-based instruction.

THE IMPACT OF TIME ON TASK

Which other variables could play a role in this context? Wallace and Mutooni had already pointed out in 1997 that users of computer-based programs indicated, in contrast to the participants in classroom-based events, the tendency to adhere to individual learning topics until a high level of content understanding had been reached. They also had a more flexible approach to learning than their fellow students, and spread this process throughout the day. It became apparent that media-based learning requires more time than traditional learning. Learners, who were not able, or did not want to devote sufficient time to computer based learning, did not benefit from media-based instruction. The opposite was the case for those who chose to invest the necessary time.

On the contrary, Pitman, Gosper, and Rich (1999) analyzed the grades and the learning behavior of 348 students. Here it became clear that the students with higher grades had more frequently and regularly requested and used the computer-based additional options than the students with lower grades. Schulman and Sims (1999) confirmed this assumption – they also noticed that the better learners preferred to learn using media-based resources and used this alternative more often, while the less successful learners normally chose traditional forms of learning.

Different time lengths would thus be a criterion that may be important for the success of media-based instruction. Apparently, sufficient periods of time

are required to learn efficiently with a computer – and that is clearly more time than with traditional, classroom learning methods. Anyone who devotes, or is willing to devote the necessary time seems to have a greater learning success. This is also confirmed by additional surveys, qualitative studies and evaluations, for instance by Scott, Durnell, Cramton, Gauvin, Steinke and Patterson (1997), who interviewed 123 distance learners for their perceptions in connection with a multinational e-learning project. The respondents stated that longer time lengths and adequate time coordination were of utmost importance. Ward and Newlands (1998) also reached a similar conclusion. The respondents stated that the main advantage achieved was their autonomy when determining the time and pace of their own learning process. This also had the effect that the learners involved invested longer periods of time in the learning contents, until they had processed all the information. Therefore, the main conclusion of Ward and Newlands (1998) was that through media-based learning more content can be acquired, but also that more time is needed to achieve this. This was also confirmed by Usip and Bee (1998), who stressed the importance of the *time* factor in media-based learning. They analyzed the differences in the attributes of the users of online offerings and attendance at lecture hours. Their main finding was that the users of computer-based options appeared to be, on average, not worse, but better than their fellow learners. One decisive argument was that, in this case also, more time was needed to acquire the learning contents, but generally in a more concentrated manner, for instance, when working through tests and performance assessments. The group of participants that was ultimately successful was the one that had a large amount of time available for learning activities.

Nevertheless, during the “Language Networks“ project within the program “Lifelong Learning“ of the German Federal-Länder-Commission for Educational Planning and Promotion Research, it became evident that an additional explanatory perspective behind these facts was needed. Apparently, the objective amount of time available does not play the attributed decisive role – as many pupils were unwilling to invest a sufficient amount of time because they did not particularly appreciate media-based learning. The surveys indicated that this was mainly due to two factors: the *learning contents* and the *learner type*.

Of course, there are forms of media-based learning in which, similar to traditional instruction, individual learners and their specific preferences and difficulties can be taken into consideration, such as with videoconferences (Bufe & Giessen, 2005; Bufe & Giessen, 2011). Partly, this also applies for so-

called “social media“, at least, again, in connection with its particular type of application.

The situation is quite different in the case of media-based learning units, tutorials, and practices, etc., which are usually standardized and where the media plays a dominant role. In many cases, acceptance or refusal to use media-based learning units are the only choices for the learner. Media-based learning is precisely developed to make the learning contents available with a certain effectiveness for large numbers of learners. Nevertheless, the result is that the learners who might be more suited for other forms of learning are forced to subject themselves to media-based methods of content delivery.

There are, of course, also options that are not imposed by schools or school teachers – for instance CDs used with language courses or similar online offerings. Nevertheless, a direct empirical comparison between two learning groups cannot be made in this context. In principle, such options seem to meet a certain demand that can be interpreted as an indicator for their efficiency. It could be the case that an early self-selection of potential learners takes place – this means that these offerings are only taken up by those who can handle media-based learning materials in an effective and targeted manner. Others probably would not want to take such offerings in the first place.

Moreover, it became apparent very early that the motivation to use media-based learning options must be seen in a more differentiated light. The quality of learning or its practical results is only one, and, sometimes, not even the most important category for deciding in favor of such an option – other categories that are as relevant or, sometimes, even more relevant are, for instance, the flexibility of time and space in the learning process and their achievable added values. The expectations in terms of educational quality and the relationship of effort invested to results achieved were, in this case, less important (Kariya, 2003). The existence of a robust market for educational media is, therefore not an argument that contradicts the assumption that there are different learner types, some of whom have difficulties with media-based learning.

LEARNER TYPES

The fact that there are different learner types has been known for a long time. Reference is made to the historical research of Kurt Lewin from 1942. Likewise, the fact that there are different learner types among computer

users is not a new finding. This insight was made popular by Sherry Turkle's book in 1984. Although the existence of different learner types, also in the context of media-based learning, should not be a surprise, and can definitely be seen as a part of Badrul Khan's (2005) e-learning model, it is noticeable that this is rarely taken into account when producing e-learning material.

As already mentioned, evaluation of the success of media-based learning is usually determined at a group level. When the evaluation leads to average results, that are not worse than the ones attained with traditional instruction methods, the lack of consideration of different learner types is hardly noticeable, at least in the context of the evaluation. It may then occur that indeed, some learners profit from media-based learning options (but perhaps at the price of an increased time input), while other learners with greater difficulties 'get lost' in the evaluations. The perspective of the learner has so far played only a subordinate role, since this is an individual category which cannot be easily depicted on a quantitative level, for instance for the granting of funds for the production of learning contents or for feedback from supervisory authorities.

For this reason, it took some time until studies that deal with the issue of learner types in the context of media-based learning were proposed. The insight that the 'learner's perspective' (Ehlers 2004) or individual, cognitive learning styles are of importance for media-based learning first appeared in studies at the middle of the last decade.

In any case, it is clear that the concept which states that media-based learning and traditional learning are of equal value, ignores important aspects – that, by the way, are related to both learning forms: some learners profit significantly more from media-based learning than from traditional learning (Giessen 2004, pp.44-47). What therefore are the variables that make media-based learning more successful – and when is it perhaps better to abstain from it? Surely, there are also situational and individual aspects that have an effect in individual cases; on a supra-individual level, the medium or also the type of media-based learning materials and the learner type seem to play the major role. Therefore, this author will concentrate hereinafter on these variables: Contents, media, and learner types.

CONTENTS

In principle – and apart from media-based learning – it is a commonplace that not all contents can be transmitted equally well with every media form. The following example illustrates this: Why are newspapers and magazines,

in most cases, the sources of investigative reporting that can even provoke a crisis in a political system, like the *Washington Post* and the *Watergate affair* in the USA in the 1970s or the *Boston Globe's* investigation of abuses in the Catholic Archdiocese of Boston in 2002? Why can this level of investigative journalism be achieved by daily newspapers, which are read by comparatively few, but certainly influential and opinion forming people, and not by television journalists, who have bigger audiences? A look at television reports clarifies quickly why this was the case. The television reporters could film the buildings related to both cases from outside and, of course, they did not have pictures of break-in at the *Watergate Hotel* nor the conduct of the Roman Catholic priests of the Boston archdiocese. Investigative journalism concerning individual scandals is, in this case, barely possible on television, because everything there has to be illustrated with video and sound bytes. This is, of course, not the case in investigative journalism. For instance, when a television camera team detects moldy food in a supermarket, it can produce impressive images that have a strong effect on the public. But in an environment where acts are no longer observable because they were carried out in the past by persons who operated secretly, there are no associated images and not even the chance to film them. Since it is almost impossible to produce investigative reports without authentic images about the behavior of the persons involved, generally this is not even attempted in television programs. This abstinence from dealing with such issues is a consequence of the requirements of this medium. Newspapers, on the other hand, can easily provide such reports and describe how the information was researched from many different sources. Such scandals have nearly always been made public by press reports in the print media. The medium is certainly decisive – as shown in this example – when determining which contents should be presented, and what public impact they might have. This insight evidently also applies for other forms of learning materials.

MEDIA

The following is a discussion of an example from a research project on the subject of 'Language Learning and Media' conducted by the author that involved the use of video clips that were produced for a multimedia offering where native speakers could be seen and heard (Giessen, 2006). The integration of authentic speech samples seemed to be a clear added value of this medium; in particular the comprehension of language could be facilitated using a synchronous input of mouth movements and phonetic production. Its integration into a multimedia offering involved the video material

being shown by default in a small window - not full screen - like a small television image. The viewing window did fill more than one fourth of the screen area, but was big enough to make the mouth movements easily visible. The learners could also switch over to a full-screen representation, but this demanded an active intervention from the learner. In the standard screen representation, the *frame* alternative is a part of the multimedia options that was seen as an additional alternative. For instance, the navigation bar, and the additional information is always available, as it was for the video clips.

The test users did not use the video segments in the manner that the researchers had expected. They stopped using the application before it was finished playing. Why did this unexpected behavior occur? The researchers observed the users, and also conducted several interviews with them. They discovered that this behavior was not due in principle to the video-based contents. The test users found the video productions in full-screen representation appealing, interesting, and didactically helpful. The unexpected user behavior was caused rather by very specific media characteristics. The students found that the primary problem when viewing video clips in computer-based multimedia products seemed to be the short distance between the watcher and the computer monitor. The learners sat very close to the monitor in order to click exactly on *icons* or *hyperlinks* with the mouse. As a rule, they focused on only a sector of the monitor screen, and sometimes only a single spot on the screen. This, of course, lead to a narrowing of focus and attention. Furthermore, the character resolution of their computer monitors was relatively low, which rapidly caused eye fatigue. Also the body posture had to be static for long periods of time. The computer monitor could not be shifted easily when their sitting position became uncomfortable and precisely when learners focused over a long period on a single spot of the monitor, their body posture was particularly tense; and this of course, reinforced fatigue effects. All the interviewed learners felt that focusing over a long period on a restricted area of the monitor in order to follow information was ‘arduous’. This can lead to the learners taking different courses of action when viewing video clips in computer-based multimedia. The users tended not to focus for very long at the rather small video frame, but instead allowed their eyes – and attention - to roam. This was enticing because there were additional frames and information next to the video image, which drew the user’s attention, caused by embedding the video frame in a visual surrounding which was also, at the same time, a rich information environment. Many learners in this “Language Learning and Media” research project actually confirmed that they may play, but did not watch a video clip for very long.

Many learners had the subjective impression that they could still follow the contents, because they could hear the acoustic information and therefore would not miss any information. But they were inevitably less focused – and naturally, missed completely the additional visual information.

Apparently an additional course of action was required regarding the testing of the possibilities of interactivity, which now could be used with moving pictures with *time based media*. Many users viewed the beginning of a video and then moved forward with the slide bar over the course of the film to determine if it was worth viewing the whole clip. When they gained the impression that it was worth viewing the whole video, they would usually look back for the position where they had 'exited'. They did not start again from the beginning, because viewing a known passage again was perceived as *boring*. It was relatively difficult to find the exact position where a video was exited. With the navigation bar, it was only possible to head approximately for a certain position, and hardly anyone keeps in mind the time code data when moving back and forth using the navigation bar. As a rule, the users could not find the exact position in the film where they had exited, so that they might see a passage twice, or miss a part of it. Often, learners left the video sequence because they were not able to reconstruct the content. Similar behavior also occurred when learners used tablets and smartphones (see also Giessen, 2013).

It is worth stating again that, in general, these alternative courses of action only occurred with videos that were embedded in multi-media, distracting environments, where the video image was relatively small and next to the navigation bar or an additional window, which distracted the user's attention. This naturally does not apply where a computer monitor with 'full-screen display' is used exclusively as a 'flat TV screen substitute', which modifies many of the external conditions. The sitting posture changes – here the computer is only the channel for a television production, and will be only used as such. The behavior described also does not apply when the learning process takes place in a class or a training course, and the learners are instructed to view the information simultaneously. This description already illustrates the inadequacy of such situation. Still, the social pressure that derives from the instructors or their classmates, who observe each other during this process, is apparently sufficient that the users tend to view video applications from beginning to end without searching or skipping portions. Multimedia options are, on the other hand, part of traditional self-learning media, and in such circumstances, the observed difficulties occur almost without exception when using authentic video material.

The researchers determined that the seemingly obvious idea of producing ‘authentic language material’ as multimedia self-learning media for computers, to facilitate for the learners an easier access to the target language, seems based on a misunderstanding. Basically, ‘authentic language material’ appears to be more suitable for streaming media or DVDs. Here, however, other advantages of a computer-based multimedia product like media changes, so that direct exercises cannot be integrated into the media, so cannot be used. In the context of computer-based multimedia techniques, however, video clips with authentic language samples appear to be rather ineffective, although its use may initially seem obvious and appropriate.

Different user behaviors were observed by the researchers when learners were viewing video clips, depending on whether they were used alone or in a group, and this suggests that media-based self-learning demands a particularly high level of self-discipline. In turn, the degree of self-discipline exerted is mostly determined by individual learners. The example of media-based learning using authentic language samples on video clearly shows the close link that exists between media production and their constraints and possibilities on the one hand, and the individual learner-type on the other hand.

SERIOUS GAMES

Similar observations can be found in regard of *Serious Games*, a genre in its own right in computer-based ludative teaching and learning (for an overview see: Ritterfeld et al., 2009; Fromme & Unger 2012; Bredl & Bösche 2013; Giessen, 2015a). For example, many learners try to avoid ’learning modes’ in order to return to a ‘gaming mode’ as fast as possible (Kerres et al., 2009). In consequence, all meta-analyses found by the author (Squirre, 2003, Kirriemuir & McFarlane, 2004; Heers, 2005; Vogel et al., 2006; Arnseth, 2006; O'Neil et al., 2005; Ritterfeld et al., 2009; Wouters et al., 2009) state that, until now, meager findings have existed in regard to the teaching and learning effects of *Serious Games.* Ke (2005) insisted that all empirical results regarding *Serious Games* depend on the technical development and the tools used; thus the current state-of-the-art should not primarily lead to the question of *whether or not* games should be integrated in a learning environment, but *how* this could be done best, with what topic, at what opportunity, in what embedment – thus, with what kind of "instructional game design" – and with what kind of learners.

LEARNER TYPES

The interaction between media-based learning material and learner types has appeared in different contexts. Bufe and Giessen (2005, 2011) (and analogously, for instance Bailey and Iqbal, 2007) emphasized that interactive online communication, which seems to be a clear, added value of the media-based language learning, as they can be produced with native speakers, suffers from the surprising fact that spontaneity is hardly possible in this context. Also, in the case of synchronous communication scenarios, for instance in video-conferences, disturbing delays of greater or lesser duration occur. Principally, there is also a lack of several items of additional communicative information, so that irony, annoyance, or boredom cannot be detected. This can negatively impact communication.

Besides the media effects, there are also other individual aspects, starting with students' widely differing perceptive abilities (Montgomery, 1999). Visual learners are better off when presented with graphical displays; whilst auditory learners are more successful when presented with information acoustically (Ferrari & Sternberg, 1998). The use of media-based learning materials by students will therefore never be the same; certain media may be adequate for some learners, but not for other learners. Therefore, it is difficult to develop general rules for the application of media.

Workman (2004) was able to demonstrate that there are qualitative differences between the World Wide Web and CD-ROMs when working on learning tasks. In this context, learning on the world-wide web had a stronger social involvement and required and induced more interactions. It should be added that being connected to the Internet and thus having the chance to switch to other web pages (or the mail program, for that matter) causes more distractions, whether this is obvious to the user or not. In any case, media-based learning on the world-wide web was less structured. However, this media has proved to be a positive experience for social learners. In contrast, learning using a CD-ROM was perceived as rather monotonous, but significantly more structured, which was positive for learners, who learn introspectively. It could even be demonstrated that learners who can better handle abstract content are more efficient web-based learners. In contrast, learners who favor specific information and wish to acquire this step-by-step, preferred learning with a CD-ROM. This research indicated that the decision whether the computer-based learning materials should be developed for the web or for a home computer is of importance, because of the specific advantages and disadvantages for the different learner types. Similar findings exist in regard of learning from paper or in the context of animat-

ed applications (Brandl, 2002; Stepp-Greany, 2002; Wästlund et al., 2005; Ackerman & Lauterman, 2012; Giessen, 2014; Mueller & Oppenheimer, 2014; Park et al., 2014, Marcinkonienė & Zdanytė, 2015).

Empirical findings regarding the importance of media and learner type date back to the 1990s (Fussell & Benimoff, 1995), and in research since there have been many similar observations (see, for instance, Tamim et. al., 2011), so that the assumption of Clark (1983) mentioned at the beginning of this chapter, which claims that a specific media is irrelevant for the learning process, can no longer be accepted. Altogether, it can be stated that when developing media-based learning materials, a one-and-only, true method does not exist. Evidently, many results are individual, situational, and context specific (Bangert, 2008; Giessen, 2015b), nevertheless, it is possible to make statements about the context where media-based learning - in a specific media - can be used purposefully and effectively. Many attempts have been made to theoretically explain the different responses observed from students.

THEORETICAL ANNOTATIONS

Meantime, there are different theories regarding, in particular, the use of media. The approaches of Herbert Marshall McLuhan (1962) are already well known, as is the related 'media richness theory' of Richard Daft and Robert Lengel (1984). Depending on how much the learners (or generally speaking: the users) are absorbed in the learning medium, Daft and Lengel (1984) speak about different degrees of "media richness": Less 'rich' media is not intensive enough to achieve an overall focusing of students' attention; for instance: discussions forums, chats, e-mail, or other forms of text communications. Another media deficit, which may cause a media platform to look *weak* includes the lack of direct feedback to the learner within the medium used. The result is almost unavoidably attention deficits and uncertainty regarding the tasks to be completed. Subsequently, using *weak* media means that the process of self and, even more so, collaborative learning (see also Mason, 2004) demands greater cognitive efforts from students, who quickly start to determine what is actually intended by the instructor and to what extent this serves what the student wants. This is perhaps the reason why more self-discipline is required in the context of media-based learning than in traditional learning situations.

Relatively new, though, are scholars' attempts to link media theory with studies on learner types. For a long time these considerations did not play a role in scholarly consideration (Flavell, 1992; Sternberg & Grigorenko, dif-

ferent cognitive learner types (Grigorenko & Sternberg, 1995). These studies, however, were usually related to traditional instruction, but it should be noted that there are marked differences between information processing and learning (Rehder & Hoffmann, 2005). Its connection with media implementation was first mentioned in the 1990s (see Pillay, 1998). It is crucial to note here how learners collect and process information (Hayes & Allinson, 1998) and subsequently address the problems and make pertinent decisions (Gardner, 2009). A decisive theoretical approach in this context is the *cognitive load theory* of Hazeltine, Ruthruff and Remington (2006). Related ideas come from Robert J. Sternberg (1997) with his quite complex and not always easy to apply *theory of mental self-government.* This theory assumes that learners, when under ideal and free conditions, organize their learning process in accordance with their cognitive abilities. This leads to various forms of mental representation or diverse codings.

Learners with different learning styles therefore need different learning situations and strategies. Some can learn better in the context of interactive group processes; others need quietness in order to be able to concentrate. This example has been chosen because it enables, at first theoretically, a link to the above mentioned media theories. The *interactive learner* group mentioned first will probably profit clearly from diverse media learning forms, for instance from discussion forums. For introspective learners discussion forums are, on the contrary, an impediment in the learning process.

Another example refers a well-known observation concerning the fact that a different group of learners can learn best when observing processes (Bandura, 1978). Apparently, mirror neurons are activated when students can observe the efforts of other learners. This increases their self-motivation and, ultimately, their learning achievements. Here, it can be assumed that media samples can have a positive effect e.g., observing and learning from television programs. On the other hand, yet another group of learners must make their own experiences that they can record and process successfully. Thus, mediated communication constitutes a limitation for them. Nevertheless, it may be that learners, who need individual experiences when learning, have an advantage through, and in online-learning environments – at least in comparison with the *observing learner type*. So we have here – at least theoretically – a specific allocation of learner type and diverse scenarios of mediated learning.

Different learner types require information of varying density and extent in order to be able to profit from instructional and learning efforts. Knowing the students' preference for density and extent in information is necessary to

assess the efforts, the problems, and the effectiveness of the respective learning process within metacognitive processes (Hayes & Allinson, 1998). Maybe this can be explained with the findings of Baruch and Nicholson (1997), who determined that learners with a strong tendency to uncertainty avoidance – who also have a very limited willingness to take risks and to get along without explicit certainty – feel rather uncomfortable with self-learning media. Additionally, there are parallels to other findings mentioned above: Since online media increases the level of ambiguity with regard to both the tasks and the expectations placed on the respective learner - and placed by the learners on themselves - learners with a low level of tolerance for uncertainty and a high level of uncertainty avoidance are at a disadvantage here, while for learners with a high level of uncertainty tolerance and low uncertainty avoidance, mediated learning can even generate additional advantages.

RECOMMENDATIONS

Obviously, it is desirable for instructors and instructional designers to know if and how media-based learning materials can be used appropriately and efficiently. In assessing whether its use is, in fact, appropriate, the findings described above, that media-based learning is basically more time-consuming than traditional learning seems at this point particularly relevant. According to this, it is important both for the instructors and the learners to use media-based learning materials in such a way that the increase in value of the content rises accordingly and the majority of learners benefit from it.

FUTURE RESEARCH DIECTIONS

A systematic approach to media choices must take into account at least the following aspects:

1. What is the effect of the medium: book, video on computers, television sets, smart phones, CD-ROM or DVD, VoIP (e.g. Skype), learning platforms, apps?

2. What are the content characteristics: e.g. which language is to be used? Is the object to study grammar, regional studies, or pronunciation practice? Is grammar for native speakers, acquisition of the first foreign language, pluri-lingual instruction?

3. Who are the learners: are they visual, auditory or kinesthetic learner types? A child or an adult learner? Monolingual, bilingual or maybe multilingual learner? Does gender eventually play a role? Or possibly also cultural characteristics?

CONCLUSION

As Khan (2005) e-learning model already demonstrates, media-based learning is very complex and a lot of aspects have to be taking into reconsideration. This chapter focused on two aspects that were rarely seen in relation: the very medium and the learning type. It could be shown that success very much depends on accepting these factors.

As seen from the discussion above, it is questionable whether a systematic approach that can link together contents, user type, and medium can be developed. As stated above, for this author, this seems be hardly possible since the above-mentioned variables and their interactions give rise to too many differing conditions. New variables are constantly being added to the manifold and, as yet, largely uninvestigated interactions between three main variables. This includes the technical developments that continuously change the media itself, setting off new conditions.

One possible instructional reaction is to always have an insight into the effects of the different variables. This is not so 'new' and less difficult to implement than it sounds, because every form of instruction needs an adaptation process between instructor and learner. It is therefore important to trust the intuition of the instructors and the learners and not to promote media-based learning where its use may be counterproductive or problematic regarding the effort-benefit relation, when using media only because it is still *stylish* and *fashionable*.

REFERENCES

Ackerman, R., & Lauterman, T. (2012). Taking reading comprehension exams on screen or on paper? A metacognitive analysis of learning texts under pressure. *Computers in Human Behaviour*, 28, 1816-1828.

Arnseht, H. C. (2006). Learning to play or playing to learn. A critical account of the models of communication informing educational research in computer gameplay. *The International Journal of Computer Game Research*, 6(1). Retreived from http://gamestudies.org/0601/articles/arnseth

Bailey, B. P. Iqbal, S. T. (2007). Understanding changes in mental workload during execution of goal-directed tasks and its application for interruption

management. *ACM Transactions on Computer-Human Interaction*, 14(21), 1-21:28.
Bandura, A. (1978). The self-system in reciprocal determinism. *American Psychologist*. 33, 344-358.
Bangert, A. W. (2008). The influence of social presence and teaching presence on the quality of online critical inquiry. *Journal of Computing in Higher Education*. 20, 34-61.
Baruch, Y., & Nicholson, N. (1997). Home, sweet work: Requirements for effective home-working. *Journal of General Management,* 23(2), 15-30.
Brandl, K. (2002). Integrating internet-based reading materials into the foreign language curriculum: From teacher-to student-centered approaches. *Language Learning & Technology,* 6(3), 87-107.
Bredl, K., & Bösche, W., (Eds.). (2013). *Serious games and virtual worlds in education, Professional development, and healthcare*. Hershey, PA: IGI Global.
Bufe, W., & Giessen, H. W. (Eds.) (2005). *Videoconferencing grenzübergreifend - La visioconference transfrontaliere.* Paris: L'Harmattan.
Bufe, W., & Giessen, H. W. (2011). Videokonferenz als medium der grenzdidaktik. In Kliewer, A., Čeřowská, M., (Eds.). *Wider den einheitsunterricht. Deutschlernen an der grenze (pp* 23-35). Liberec: Technical University of Liberec Press,.
Clark, R. E. (1983). Reconsidering research on learning from media. *Review of Educational Research,* 53(4), 445-459.
Daft, R. L. & Lengel, R. H. (1984). Information richness: A new approach to managerial behavior and organizational design. In Cummings, L. L. & Staw, B. M. (Eds.). *Research in organizational behavior*. (6, pp. 191-233). Homewood, IL: JAI Press:.
Ehlers, U. (2004). *Qualität im e-learning aus lernersicht. Grandlagen, empirie and modellkonzeption subjektiver qualität*. Wiesbaden: VS-Verlag.
Ferrari, M., & Sternberg, R. J. (1998). The development of mental abilities and styles. In Damon, W., Kuhn, D., & Siegler, R. S. (Eds.). *Handbook of child psychology*, Vol. 2, (pp. 899-946). New York: Wiley,
Flavell, J. H. (1992). Cognitive development: Past, present, and future. *Developmental Psychology*, 28, 998-1005.
Fromme, J., & Unger, A. (Eds.) (2012). *Computer games and new media cultures. A handbook of digital games studies*. Heidelberg: Springer.
Fussell, S. R., & Benimoff, N. I. (1995). Social and cognitive processes in interpersonal communication: Implications for advanced telecommunications technologies. *Human Factors*, 37, 228-250.
Gardner, H. (2009). Fünf kompetenzen für die zukunft. In Giessen, H. (Ed.). *Medienpädagogik: Emotionale Intelligenz in der Schule. Unterrichten mit Geschichten (pp.* 138-149). Weinheim, Basel: Beltz-Verlag..
Giessen, H. W. (2004). *Sprachnetzwerke in grenzräumen*. Saarbrücken: LPM 2004
Giessen, H. W. (2006). Videosegmente als authentische lehrmaterialien für den sprachunterricht in computergestützten multimedia-produktionen? In

bzf (= Beiträge zur Fremdsprachenvermittlung). Heft 45, 91-96. Retreived from http://www.vep-landau.de/bzf/2006_45/07_Giessen_091-096.pdf

Giessen, H. W. (2013). Formale aspekte bei der videoproduktion für handys. *Journal of Serial Narration on Television*, 4, Winter 2013, 33-52. Retrieved from http://www.uni-saar-land.de/fileadmin/user_upload/Professoren/fr41_ProfSolteGresser/serial-narration/PDFs/Journal_04-2013/033-052_a23dnd7.pdf

Giessen, H. W. (2014). Über den Einsatz medienadäquater Präsentationsformen im Fremdsprachenunterricht: Darstellung der Methode und Anmerkungen zum thematisierten Inhalt. In: *Fremdsprachenunterricht im Spannungsfeld zwischen Sprachwissen und Sprachkönnen*. herausgegeben von Thomas Tinnefeld unter Mitarbeit von Christoph Bürgel, Ines-Andrea Busch-Lauer, Frank Kostrzewa, Michael Langner, Heinz-Helmut Lüger, Dirk Siepmann. Saarbrücken: htw, 153 – 172.

Giessen, H. W. (2015a). Serious games effects: An overview. *Procedia - Social and Behavioral Sciences*, 174, 2240 – 2244. http://dx.doi.org/10.1016/j.sbspro.2015.01.881/2015

Giessen, H. W. (2015b). Media-based learning methodology: Stories, games, and emotions. In Ally, M., Khan, B. H. (2014). *The international handbook of e-learning* Vol. 2 (pp. 43-54). London: Routledge..

Grigorenko, E. L., & Sternberg, R. J. (1995). Thinking styles. In Saklogsk E., & D. H., Zeidner, M. (Eds.). *International handbook of personality and intelligence* (pp. 205-229). London: Plenum Press,.

Hayes, J., & Allinson, C. W. (1998). Cognitive style and the theory and practice of individual and collective learning in organizations. *Human Relations*, 51, 847-871.

Hazeltine, E., Ruthruff, E., & Remington, R. W. (2006). The role of input and output modality pairings in dual-task performance: Evidence for content-dependent central interference. *Cognitive Psychology*, 52, 291-345.

Heers, R. (2005). *Being there: Untersuchungen zum Wissenserwerb in virtuellen Umgebungen*. Tübingen: Eberhard-Karls-Universität, Diss. Informations-und Kognitionswissenschaften.

Kariya, S. (2003). Online education expands and evolves. *IEEE Spectrum*, 40, 49-51.

Ke, F. (2009). A qualitative meta-analysis of computer games as learning tools. In Ferdig, R. E. (Ed.) *Handbook of research on effective electronic gaming in education* (pp. 1-32). Hershey, PA: IGI-Global.

Kerres, M., Bormann, M., & Vervenne, M. (2009). Didaktische konzeption von serious games: Zur verknüpfung von spiel- und lernangeboten. *Medienpädagogik* Retrieved from http://mediendidaktik.uni-due.de/sites/default/files/kerres0908_0.pdf

Khan, B. H. (2005). *Managing e-learning: design, delivery, implementation, and evaluation*. Hershey, PA: Information Science Publishing.

Kirriemuir, J., & McFarlane, A. (2004). *Literature review in games and learning*. Bristol: Futurelab. Retrieved from

http://hal.archivesouvertes.fr/docs/00/19/04/53/PDF/kirriemuir-j-2004-r8.pdf

Lewin, K. (1942). Field theory of learning. In *Yearbook of the national society for the study of education* (pp. 215-242), Vol 41, Part 2.

Marcinkonienė, R., & Zdanytė, J. (2015). Conventional and digital media in language learning. *Proceedings ICoN 2015* (pp. 101–111). Kaunas: Technical University of Kaunas Press.

Mason, R. (2004). Online education using learning objects. *British Journal of Educational Technology*. 35, 752-754.

McLuhan, H. M. (1962). *The gutenberg galaxy: The making of typographic man*. Toronto: University of Toronto Press.

Montgomery, D. A. (1999). Human sensitivity to variability information in detection decisions. *Human Factors*. 41, 90-105.

Mueller, P. A. & Oppenheimer, D. M. (2014). The pen is mightier than the keyboard: Advantages of longhand over laptop note taking. *Psychological Science*, 25, (June 2014), 1-10.

O'Neil, H. F., Wainess, R., & Baker, E. L. (2005). Classification of learning outcomes: Evidence from the computer games literature. *The Curriculum Journal*. 16(4), 455-474.

Park, J., Yang, J., & Hsieh, Y. C. (2014). University level second language readers' online reading and comprehension strategies. *Language Learning & Technology,* 18(3), 148-172.

Pillay, H. (1998). An investigation of the effect of individual cognitive preferences on learning through computer-based instruction. *Educational Psychology*, 18, 171-182.

Pitman, A. J., Gosper, M., & Rich, D. C. (1999). Internet-based teaching in geography at Macquarie University: An analysis of student use. *Australian Journal of Educational Technology*, 15, 167-187.

Rehder B., & Hoffman, A. B. (2005). Eye tracking and selective attention in category learning. *Cognitive Psychology*, 51, 1-41.

Ritterfeld, U. (2011). Beim spielen lernen? Ein differenzierter blick auf die möglichkeiten und grenzen von serious games. *Computer + Unterricht*. 84, 54-57.

Ritterfeld, U., Cody, M. J., & Vorderer, P. (2009). *Serious games: Mechanisms and effects*. New York: Routledge.

Schulman, A. H., & Sims, R. L. (1999). Learning in an online format versus an in-class format: An experimental study. *Technological Horizons in Education – T.H.E. Journal* 26(11), 59-65.

Scott, D., Durnell Cramton, C., Gauvin, S., Steinke, G., & Patterson, K. (1997). Internet-based collaborative learning. An empirical evaluation. *Proceedings of the 3rd Ausweb Conference*, Lismore, Australia, 1997. Retrieved from http://ausweb.scu.edu.au/proceedings/donscott/index.html

Squire, K. D. (2003). Video games in education. *International Journal of Intelligent Simulations and Gaming*, 2 (1). Retrieved from http://website.education.wisc.edu/~kdsquire/tenure-files/39-squire-IJIS

Stepp-Greany, J. (2002). Student perceptions on language learning in a technological environment: Implications for the new millennium *Language Learning & Technology*, 6, (1) 165-180.

Sternberg, R. J. (1997). *Thinking styles*. New York: Cambridge University Press.

Sternberg, R. J., & Grigorenko, E. L. (1997). Are cognitive styles still in style? *American Psychologist*, 52, 700-712.

Tamim, R. M., Bernard, R. M., Borokhovski, E., Abrami, P. C., & Schmid, R. F. (2011). What forty years of research says about the impact of technology on learning: A second-order meta-analysis and validation study. *Review of Educational Research*, March 2011, 81(1), 4-28.

Turkle, S. (1984). *The second self: Computers and the human spirit*, Cambridge, MA: MIT Press

Usip, E. E., & Bee, R. H. (1998). Economics: A discriminant analysis of students' perceptions of web-based learning. *Social Science Computer Review*, 16, 16-29.

Vogel, J. J., Vogel, D. S., Cannon-Bowers, J., Bowers, C. A., Muse, K., & Wright, M. (2006). Computer gaming and interactive simulations for learning: A meta analysis. *Journal for Educational Computing Research*, 34(3), 229-243.

Wallace, D. R., & Mutooni, P. (1997). A comparative evaluation of world wide web-based and classroom teaching. *Journal of Engineering Education*, 86, 211-219.

Ward, M., & Newlands, D. (1998). Use of the web in undergraduate teaching. *Computers and Education*, 31*,* 171-184.

Wästlund, E., Reinikka, H., Norlander, T., & Archer, T. (2005). Effects of VDT and paper presentation on consumption and production of information: Psychological and physiological factors. *Computers in Human Behaviour,* 21, 377-394.

Workman, M. (2004). Performance in Computer-based and Computer-aided Education: Do Cognitive Styles Make a Difference? *Journal of Computers in Human Behavior,* 20, 517-534.

Wouters, P., van der Spek, E. D., van Oostendorp, H. (2009). Current practices in serious game research: A review from a learning outcomes perspective. In Connolly, T., Stansfield, M., & Boyle, L. (Eds.). *Games-based learning advancements for multi-sensory human computer interfaces: Techniques and effective practices* (pp. 232-250). Hershey, PA: IGI-Global,.