DISCUSS DEWEY AND SHON – TWO RECURRING BIG NAMES IN REFLECTION!!

Reflection, as Dewey (1964)pointed out, propels "intelligent action" (p. 211). – opening line?

2 Background

2.1 What is reflective learning?/Reflective Learning: A Short History

2.1.1 Kolbs

2.1.2 Gibbs

More…

2.2 Individual reflection

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2.3.1 Jupyter Notebook for novice programmers

2.6 Collecting reflections

Journals, diaries, integrated software etc.

2.7 Reflective data usage

How can we use the data? Guide user, lecturers usage

2.8 Summary

2.1 What is reflective learning?/Reflective Learning: A Short History

Experience Based Reflection

Education and reflection go together; reflection is a key aspect of education that is sometimes overlooked(why is it overlooked James!). There are several different approaches to reflection as an educational tool. One of which is based on Kolb’s work in 1984 which looked at the learning experience and its relationship with self-reflection to help learners understand abstract concepts. Kolb (1984) developed a four-stage reflective cycle which takes learning and applies it to new experiences(4). This starts with a concrete experience, reflection of the experience, making conclusions, and finally applying what has been learned onto new problems. Following this, in 1988 Gibbs extended Kolb’s work and developed a six-stage reflective cycle (5). This started with an experience, students would then contemplate their thoughts and feelings about that experience, evaluate the impact of the experience, analyse to understand the situation, concluded what has been learnt from the experience, and finally devise an action plan to deal with similar situations. Both Kolb and Gibbs developed patterns that focus on trying to understand what had happened and give an opportunity for students to pick out where they went wrong themselves. The key points are that the students themselves identified issues and then evaluated them. Although Gibbs adds relevant additions to Kolb’s reflective practices the fundamental rules that the student must identify and decide an appropriate response is present throughout.

The experience-based view on reflection argues that reflections allow students to understand key concepts and generalise main principles from an experience (Kolb 1984). In-order to articulate an experience, learners must have a mechanism to record their immediate reflections on an event. The use of journals, and feedback prompts to help guide students has been looked at previously (Roskos, Vukelich, & Risko, 2001)

Reflection is an important aspect of an academic journey but has been shown to be a difficult concept for beginners to understand and apply to their practices. This may have been due to a lack of well-documented information on beginner students and from the teachers themselves teaching novice students(Rosks et al, 2001). Whatever the case may be, reflection does help beginners learn at a higher level and prompts deeper inter-subject knowledge connections.

Roskos, K., Vukelich, C., & Risko, V. (2001). Reflection and learning to teach reading: A critical review of literacy and general teacher education studies. Journal of Literacy Research, 33(4), 595-635. doi:10.1080/10862960109548127

Education and Experience by John Dewey

John Dewey’s work, *Education and Experience*, looks at the deep connection between experienced events and their relationship with education. Noting that delicate connection between a positive experience which may arouse curiosity, and the desire to continue their studies further. Conversely, Dewey’s view points out the danger of deterring a potential student from pursuing further research within the subject because of a negative experience. This could perhaps be when a challenge was too challenging and advanced that the student was completely lost, turning them away from the feeling of curiosity and warmness to a new subject.

The learning experience does not ever end for some; “education as growth” (Dewey) shows that education is a condt

Chapter 3: Criteria of Experience

* If experience “arouses curiosity, strengths initiative; and sets up desires and purposes” the leads to a positive outlook and carries person further in the field when they may otherwise drop off
* “Education as growth”: Growth within education should be a constant process
* “each present experience must have a worth-while meaning” – experiences should have meaning and purpose or else they are redundant – the student experience should have experience or else becomes tedious and could have a negative impact
* The persons which connect the present experience and future “have achieved maturity” – recognising what is done and studied in the present will have an impact for the future – users should understand what they are doing will reap reward. Favourable effect on future

Chapter 2: The Need of Theory of Experience

* “organic connection between education and personal experience” – experience and education come together, self-reflection is education
* Although all experiences are not “equally educative” - not all experience is positive and can be used as self-reflection – how to find good experience to reflect on? Can reflecting on (negative) experience have a negative impact?

2.1.1 Kolbs

2.1.2 Gibbs

More…

2.2 Individual reflection

Hunt, D. P. (1982). Effects of human self-assessment responding on learning. Journal of Applied Psychology, 67(1), 75–82. [https://doi.org/10.1037/0021-9010.67.1.75](https://psycnet.apa.org/doi/10.1037/0021-9010.67.1.75)

Self-assessed learning

<https://www.tandfonline.com/doi/full/10.1080/00405840802577544>

Reflections are closely linked to self-assessment and both terms are often used interchangeably. Definitions of self-assessment describe self-assessment as a process where learner evaluate their own progress in a subject area and compare it against a set of standards to which they aspire (Andrade and Valtcheva link above). Self-assessed learning is not a new concept and is applied throughout academic institutes. Students generally have a positive attitude toward self-assessment  [CitationAndrade & Du, 2007](https://www.tandfonline.com/doi/full/10.1080/00405840802577544), p. 164), mainly due to the perceived benefit of actively critiquing their own work. Suggesting that students active engagement with self-reflection may be negatively impacted if the reflective tool does not pose a positive impact to their learning.

As discussed by Hunt (1982) student self-assessment during the “learning stage” can be used to indicate the level at which the students are learning. During his 1982 study, Hunt looked at the effects of dynamic feedback from students during a lecturer. This was distributed via a selection of buttons representing different levels of sureness which student were prompted to press at various stages during lectures. This allowed the students the students to keep a record of how “sure” they felt about a concept or answer and gave an indication to the lecturer as to how comfortable the class where about the new material. The results from the study showed that there was a higher level of learning with the self-assessed group of participants, and that there was an even higher acquisition when students completed self-assessment after answering questions on the material. Hunt’s work indicates that students learn better when they are asked to reflect on how sure they feel after completing questions. Furthermore, there appears to have been no negative aspect to how the participants used the tool compared with the control group. The tool was easy to understand and simple to use so the students could apply self-assessment with it hindering the actual learning.

2.3 Collaborative reflections

2.4 Reflective learning in computing science

2.1 Education and Experience

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Technology and Reflective Practices by Tom Boyle

Chapter supplied by Steve Draper

* Schon’s argument of “reflection in action” – reflection during an ongoing process.
* Reflection after an event – second type of reflection which involve a retrospective look at past events in the hope to deal with the situation better in the future
* Schon argues that reflection in and on action should be the basis of a new sharable body of knowledge
* “We don’t know how to help our students learn about the abstraction that are so important in computing” – i.e we don’t know how to teach coding
* Similar experiments:
  + Boyle 2003 – blended approach to learning coding language. More emphasis on sequence of programs producing visible graphical outputs. Lead to a marked improvement form 12-23 %

*We should think about practice as a setting not only for the application of knowledge but also for its generation.* (Schon 1995: 19)

Whilst looking at when the learner reflects, Schon argues that ‘reflection in action’(embedded notes, emotions etc) occurs by surprise. Reflection happens when an event unfolds unexpectedly. The immediate reflection from an unexpected result can then be built upon further by ‘reflecting after the event’(reflection at end of notebooks!!) as the student attempts understand the foreign concept and adopt an action strategy to deal with similar situations in the future. Building from Schon’s work, Boyle looks at how reflective learning can be applied to computing science. Boyle adopted a blended approach to learning new coding languages. His research has shown that visible and graphical outputs lead to marked improvements of how well students learnt new coding languages.

Throughout the study, Boyle noted that how to teach students “new abstractions” such as new languages is a particularly vacant area in the broader computer science education sphere. Simply put, Boyle believes that we do not know how to teach coding to novice programmers. The challenge with learning a new language is that the task is too vast and expansive to accurately argue that there is a particular technique or way to go about learning. Each student’s learning journey is different and how they learn is unique, it is therefore important to acknowledge that novice programmers require time for them to develop their own way of learning. This could be achieved through the application of self-reflective practices when novice programmers learn a new coding language.

Shon, D. A. (1995) ‘Knowing-in-action: The New Scholarship Requires a New Epistemology’, *Changes*, November/December: 27-34

2.5 Beginner friendly technology

Tools like Scratch have been shown to be good starting tools for beginner programmers (2, Sim and Lau). The drag and drop nature allows students to see high level concepts in action without the need for accurate syntax. This may be a good starting point for developing a reflective tool. There are very little products that allow for integrated reflective learning for beginner programmers. Notetaking is a successful way for students to increase their level of self-evaluation and encourage reflection on material (3). Developing a reflective tool especially for beginner programmers should be developed with a simple beginner level language in mind and cover basic topics. This would avoid any external factors like the language semantics and complex topics effecting the results of the study.

Active learning through online tools is one of the more popular methods to help novice programmers get started.(Sim and Lau)

Sim and Lau- https://ieeexplore.ieee.org/abstract/document/8632649

2.3.1 Jupyter Notebook for novice programmers

Jupyter Notebook is the most used system for interactive literate programming (Shen 2014). Designed to make data analysis easier to share, document, and replicate (Pimentel et al 2019), Jupyter Notebook is an online IDE which supports a variety of languages such as Julia, R, Javascript, C and Python. Jupyter Notebook is most used to support Interactive Python Notebooks (.IPYNB files). These allow users to insert Markdown text based cells and Python cells within a .ipynb file.

First coined by Knuth (1984), *literate programming*, relates to combing code and natural language to enable developers to state the thoughts underneath a program’s logic. (Insert image here) Intuitively, the design allows parts of a notebook to be compiled with an immediate visual representation of results and text. Notebooks can also be easily employed to deliver tutorial or lab content to students due to its editable nature and east to use interface. These factors make Jupyter Notebook a highly appealing IDE to initially start with for beginner programmers. It is already widely used across many academic institutions such as the University of Glasgow.

Fig. 1. - 
A notebook example with markdown, code, and output.
 - taken from Pimentel et all fig. 1.

J. F. Pimentel, L. Murta, V. Braganholo and J. Freire, "A Large-Scale Study About Quality and Reproducibility of Jupyter Notebooks," 2019 IEEE/ACM 16th International Conference on Mining Software Repositories (MSR), Montreal, QC, Canada, 2019, pp. 507-517, doi: 10.1109/MSR.2019.00077. keywords: {Programming;Tools;Testing;Python;Best practices;Media;jupyter notebook;github;reproducibility},

D. E. Knuth, "Literate programming", The Computer Journal, vol. 27, no. 2, pp. 97-111, 1984.

H. Shen, "Interactive notebooks: Sharing the code", Nature News, vol. 515, no. 7525, pp. 151, 2014.

NBExtensions – the extendibility of Jupyter Notebook – discuss this in a section!

Jupyter Notebook does not offer much support for create extensions or plug-ins. Ther is however an unofficial Jupyter Notebook extension framework known an NBExtensions (<https://jupyter-contrib-nbextensions.readthedocs.io/en/latest/index.html>). The unofficial Jupyter Notebook extensions is currently an open source guthub repository (https://github.com/ipython-contrib/jupyter\_contrib\_nbextensions/blob/master/docs/source/index.rst) and can be installed following a set of instructions found on their website (link). For the purposes of creating a reflective tool extension, using NBExtension allows the tool to be created iteratively and allows the tool to be distributed after development.

2.6 Collecting reflections

Studies have shown that reflective journals can have a negative impact on student experience and should therefore not be recommended for all students(1). There is however evidence to suggest that some students who engaged positively with a reflective journal had a better experience. Journals should be implemented with care and be carefully managed to not become tedious which led to frustration and a lack of engagement with students. Learning journals may be difficult to implement as they involve close attention and a tailored approach based on the student.

Journals, diaries, integrated software etc.

2.7 Reflective data usage

How can we use the data? Guide user, lecturers usage

2.8 Summary

Overall, lots of reflective stuff but no specific integrated self-reflection tool for beginner programmers. – therefore my tool and project brings value to the field!

Bibliography

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2 - <https://link.springer.com/article/10.1007/s10758-018-9391-y>

3 - Chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://files.eric.ed.gov/fulltext/EJ1099318.pdf – study looking at correlation between students taking notes and self-reflection.

4 - [www.cambridge-community.org.uk/professional-development/gswrp/index.html](http://www.cambridge-community.org.uk/professional-development/gswrp/index.html)

5 - [www.ed.ac.uk/reflection/reflectors-toolkit/reflecting-on-experience#:~:text=The%205R%20framework%20for%20reflection%20will%20guide%20you%20through%20Reporting,sense%20of%20a%20learning%20experience](http://www.ed.ac.uk/reflection/reflectors-toolkit/reflecting-on-experience#:~:text=The%205R%20framework%20for%20reflection%20will%20guide%20you%20through%20Reporting,sense%20of%20a%20learning%20experience)

Gibbs Full PDF - chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://thoughtsmostlyaboutlearning.files.wordpress.com/2015/12/learning-by-doing-graham-gibbs.pdf